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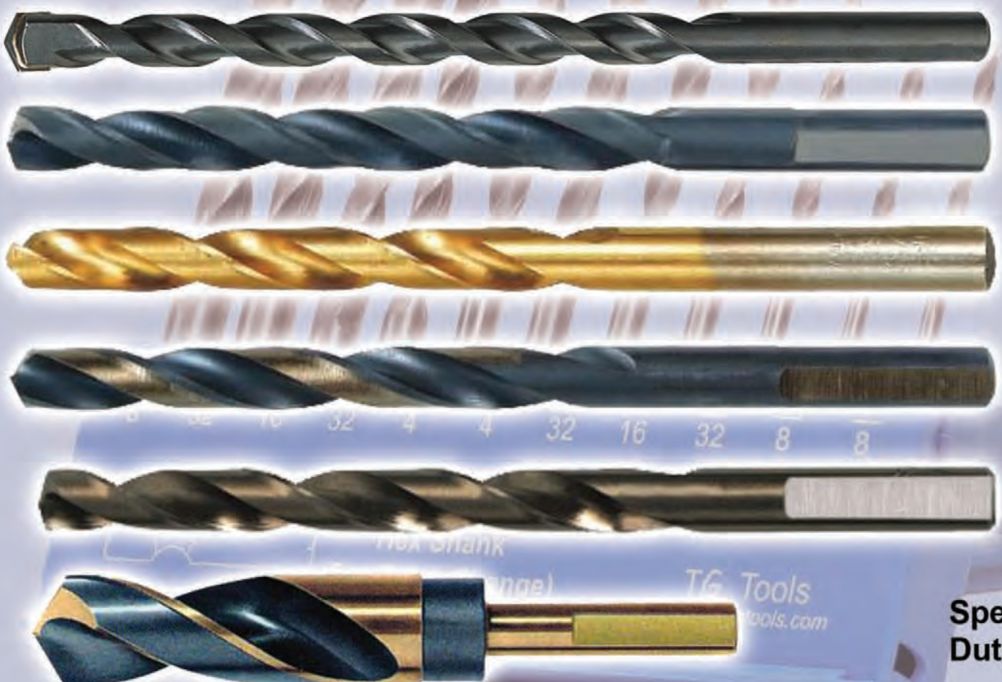

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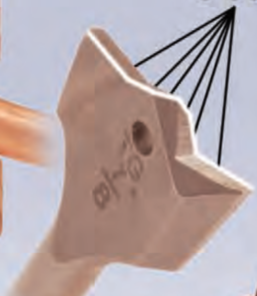

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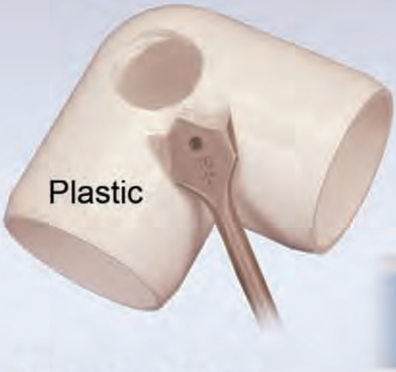

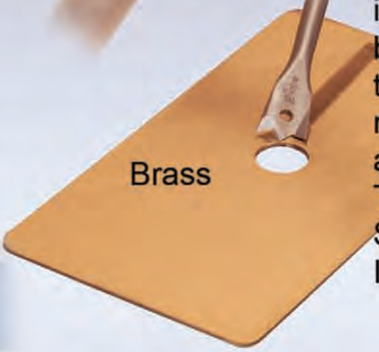

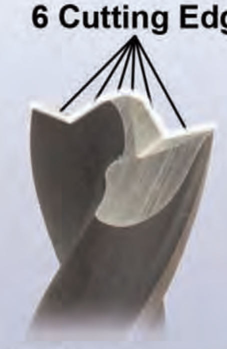

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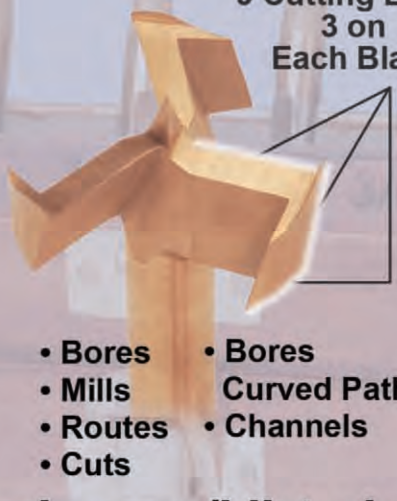

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# LETTER

## From The Editor-In-Chief

Fall means different things to different people. For students it's an exciting time to meet new classmates and teachers. Some people get very reflective, inspired by the changing leaves at the twilight of the year. But for most Alabamians, fall is all about football. It's practically a religion; you target your rivals, you get behind your team, and every weekend you work yourself into a froth while rooting them on with friends and family. Fall can get pretty infectious down here, and some folks get downright obsessed. So, allow me to throw a little water on the fire and remind everyone of some important fall home maintenance not to overlook.

First, make sure the caulking or weather-stripping around your doors and windows is adequate to reduce drafts and lower the heating bills. This also helps prevent water damage to the windows and door frames. For old, leaky windows with removable screens, take down the screens and replace with storm windows and doors.

Next on the checklist is to replace your furnace filter, which allows the air to flow freely so your heating and cooling systems operate properly. Most experts suggest having a heating professional check your system every year. If you have a chimney, show it some TLC before sparking it up for winter. A certified chimney sweep can inspect and clean the flues and connector pipes, and check your fireplace damper. You should also check the chimney for loose or missing mortar, and remove any bird nests from the chimney flue.

Clean your gutters and downspouts thoroughly during the fall. If left neglected, the buildup of leaves and other debris can block drainage, leading to overflow, wood rot, pest infestations, and the potential for foundation damage due to improper drainage.

Also, take out your lawnmower for one final run to empty all the gas out of the fuel tank. Do the same with all your gas-powered lawn equipment. This not only removes combustible liquid from being stored in your shop or garage, but it reduces the likelihood that old, stale gas will cause start-up problems when you crank the motors next spring.

And finally, before the cold really snaps, make sure your pipes and hose bibs are well insulated to prevent pipes freezing and bursting.

I'd suggest knocking out these chores on the weekday evenings. They won't take too long, and you'll have the whole weekend to dedicate to the game.

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# Q&A Got a ?

*Questions About Home Building, Remodeling? Have Your Own How-To Tip? Visit our website at **www.extremehowto.com** and click on How-To Forum.*

Q. *We've used an exterminator to kill cockroaches inside our house, and the service seems to have worked inside. The problem is all the cockroaches left outdoors. At night, you can see dozens of them scurrying around the driveway, and I assume they're coming from the city sewer system. How can I kill the roaches outside?*

A. Try using boric acid, which you can pick up in the pest control section of most drug stores. Apply the powder to the problem areas according to the manufacturer's instructions. Boric acid is deadly poison to pests like roaches and other insects, but safe for people and pets, generally considered to be no more toxic than table salt. Boric acid powder is usually applied to cracks and crevices in a thin layer where insects travel. When the insect crawls over the treated area, their legs become coated in the powder, which is then absorbed through their outer body or ingested when the insect grooms itself. Once absorbed, the acid begins poisoning the insect until it dies. Reapply the product every couple of days after it rains. It may take a couple of weeks of reapplication to completely eliminate the pest problem.

……

Q. *I am working on a new deck and would like to cover up a 6-by-6 post with cedar. What is the best way to get this to look seamless, like a solid cedar post?*

A. Pick out four of the straightest and flattest 1-by-10 cedar boards you can find. Use a table saw to rip 45-degree outside miters along the edges of each board. Install the four sides wrapping the post, making sure the miter joints line up at the edge. Glue and finish-nail the corners very carefully. Run the edge of a nail set along the seams to close the wood grain. Seal any open cracks that may turn up using caulk colored to match the finish.

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# Q&A Got a ?

*Questions About Home Building, Remodeling? Have Your Own How-To Tip? Visit our website at* ***www.extremehowto.com*** *and click on Home Repair Forum.*

**Q:** *We'd like to replace an old vinyl floor with tile. The flooring currently has a vinyl base strip that is firmly attached to the wall. Is there an easy way to remove this without tearing up the drywall behind the base?*

**A:** To minimize the repair work on the drywall surface, use a heat gun over the base strip to warm the adhesive and loosen its grip on the vinyl. In a pinch, you could potentially use a hair dryer to similar effect. As the adhesive loosens, pull away the base strip. Take the extra time to reheat the exposed adhesive and scrape it away from the face of the drywall with a putty knife. This should leave a fairly smooth surface to easily reinstall new base trim once the flooring has been installed.

……

**Q:** *What's the best way to remove burn marks left by a router?*

**A:** Sometimes when cutting across the wood grain at a low feed rate, the wood can burn leaving unsightly dark marks. If you can spare the wood stock, the easiest way is to get a new bit and carefully make one more pass with the router (a cut as shallow as 1/64 inch should remove the marks). Sanding with a fine-grit abrasive is another option, but sanding a routed profile can be difficult. You'll find it easier to sand out burn marks if you apply mineral spirits to the burn before sanding. After a few minutes the spirits will penetrate the glazed area, and the marks should be easy to sand off. **EHT**

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# One Rung Up

## Update on Ladders and Ladder Accessories

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WHORSE

*Accessories such as ladder stabilizers increase safety and hold the ladder away from the building for unobstructed access to the work area.*

**By Matt Weber**

Like it or not, many home repairs and maintenance chores require working atop a ladder. From simple indoor jobs, like hanging a light fixture, to roof work and gutter cleaning, there's a ladder to fit every job. Here's a look at a few advances in design and accessories that make ladder work a little less daunting for the home handyman.

### EXTENSION LADDERS & ACCESSORIES

Although I'm willing to work on a ladder on my split-level house, I won't pretend to like it. I don't like heights in general, and two stories is probably my limit. So, it's not a happy moment when I'm halfway up a ladder and feel the thing sliding from beneath me. That's happened in the past, and I managed to awkwardly jump to safety with my neck intact as the ladder crashed to the ground. I was lucky—and careless—but I learned a lesson: Always set up a ladder carefully before climbing on top.

The most elevated work around the home often requires an extension ladder, and the higher the ladder, the more important it is to exercise all safety precautions.

For work on extension ladders, I suggest adding a stabilizer to the top ladder. Stabilizers are available from a variety of manufacturers, and they generally consist of arm-like extension braces with rubber pads that grip the work surface to keep the top from slipping sideways. The Werner version that I bought simply clamps to the ladder frame beneath the top rung using a couple of wing nuts. These accessories distribute the load to prevent damage to materials like metal siding. Ladder stabilizers are also wide enough to span window openings, and they hold the ladder away from the building for easy, unobstructed access to gutters and overhangs. Prices for stabilizers usually range from $25 to $70 dollars, and they're sold at most hardware stores and home centers.

The easiest way to raise a long extension ladder is to do it with two people. In this case, the ladder is extended as necessary

*To raise an extension ladder, it helps to have an assistant "foot" the bottom securely to the ground while a second person walks it upward.*

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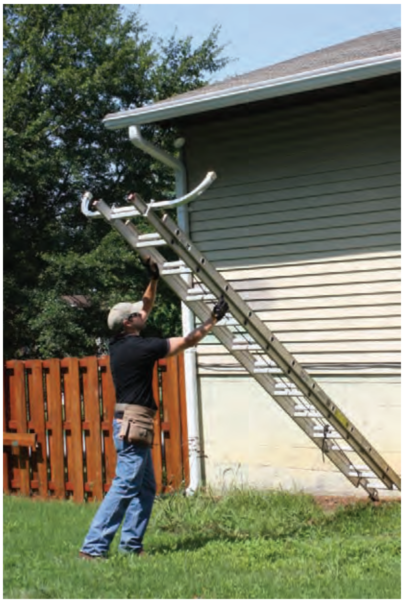
and one person "foots" the first rung, holding the bottom of the ladder securely to the ground as the second person walks toward the house with the other end of the ladder, raising it with the first person's help.

In some cases you can raise an extension ladder alone, but the ladder needs to be collapsed to its shortest height. First, brace the foot of the ladder against the wall and walk it slowly toward the base, rung by rung and hand by hand, until the ladder is upright. Rest the top of the ladder against the wall, roof or other solid surface. Then, lift the base out to a slight angle where it can temporarily rest without your support. Extension ladders are equipped with a lanyard and pulley to help extend the ladder. To use the lanyard, first foot the bottom rung, carefully tilt the ladder backward with one hand and pull the rope with the other to extend the ladder as necessary. Be careful of hazards to nearby power lines, people or other accidents waiting to happen.


*If working alone, you can brace the bottom of the ladder against the building and walk it upright, rung by rung.*

Positioning the ladder at its final correct angle is one of the most critical steps of the setup. Too much angle and the weight of the user could bend the ladder, or the bottom could slide out of position. Then again, if it's too steep the ladder could tip over backward. An extension ladder should be set with the base 1 foot away from the wall for every 4 feet the ladder reaches, or roughly a 75-degree angle.

Next, secure the feet. The base of the ladder should rest

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*Extension ladders are equipped with a lanyard and pulley to help raise the top frame to the appropriate elevation.*

on level ground with the feet flipped in position. On some surfaces, such as wooden decks, you can nail a board down behind the feet to act as a cleat and prevent slippage. When setting up on uneven ground, it often helps to dig a small trench beneath the high foot of the ladder to level the base.

Some ladders now come equipped with adjustable leg-leveling extensions. These extensions are also available as add-on accessories, such as the Xtenda-Leg ladder levelers that bolt onto the bottom of your ladder. The ladder levelers allow you to adjust the length of each ladder stile independently of the other one—very useful for the many of us with sloped yards (www.ladderlevelersllc.com).

*Positioning the ladder at its final correct angle—roughly 75 degrees—is one of the most critical steps of the setup.*

Before climbing aboard, make sure all locks are engaged and that the ladder is supported securely at all contact points. If the setup still seems the least bit unstable, then tie ropes to the ladder stiles beneath the

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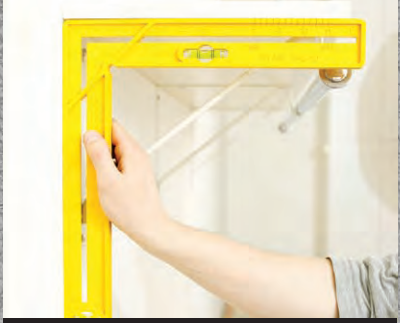
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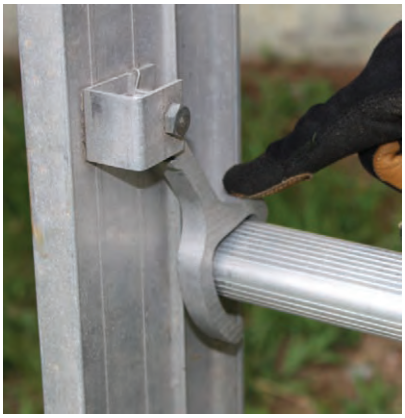
lowest rung and anchor them to something solid. You can also secure the top of the ladder using rope or wire fastened to a couple of eye screws mounted in the fascia board.



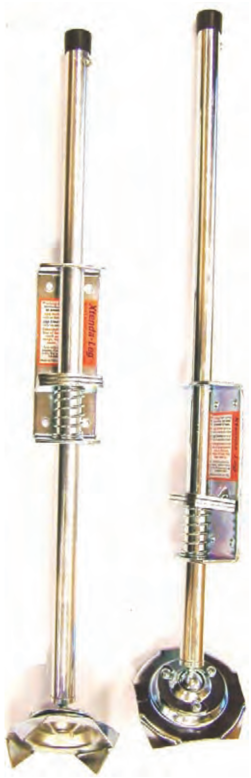
*Before climbing, make sure all locks are engaged and that the ladder is supported securely at all contact points.*

*In some cases it may be necessary to dig a trench beneath one of the feet to properly level the ladder.*

Use both hands, while climbing, but if you must carry something, face the ladder and hold on with one hand. Never stand above the fourth rung from the top of an extension ladder.

## MULTI-POSITION LADDERS

Because ladders are generally large, heavy and bulky, they're



*Some leg extensions are available as add-on accessories. The Xtenda-Leg ladder levelers bolt onto the bottom of your ladder to adjust each leg independtly.*

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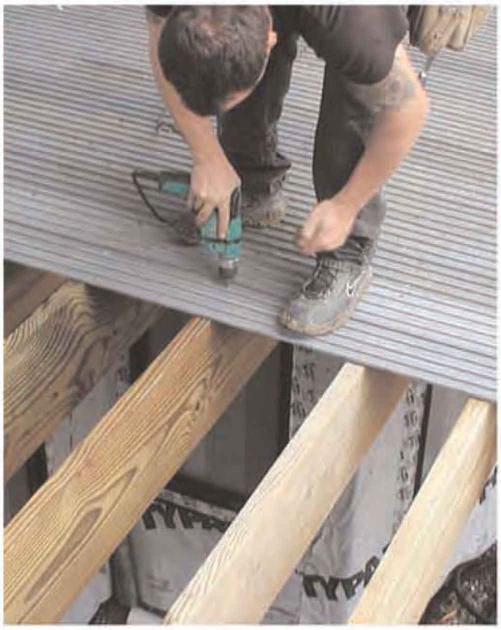
STOKES LADDERS



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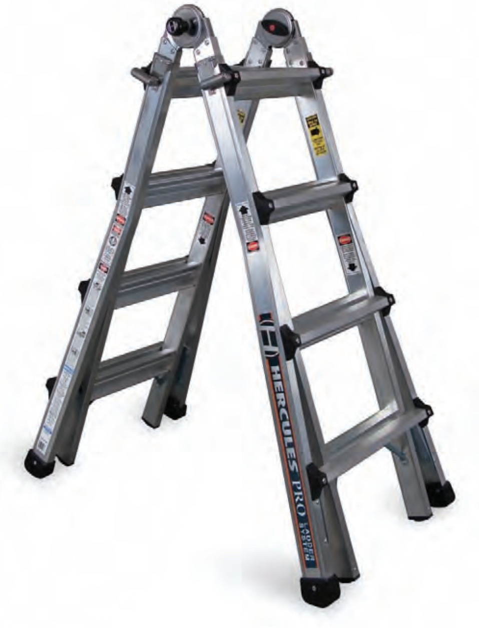

*Hercules Ladder Systems' Model LS1A45H is a multi-position ladder that serves as a height-adjustable stepladder, a stairway ladder and a 22-foot extension ladder.*

tough to store. However, different ladders serve different needs. A 6-foot A-frame stepladder wouldn't do my gutters a bit of good. On the other hand, I'd never be able to weave an extension ladder into my house without putting one end or the other through the drywall. Multi-position ladders offer a cool compromise that minimizes storage requirements and makes portability easy.

The original multipurpose ladder was invented in Europe, eventually to become known as the Little Giant Ladder. By articulating like an A-frame and also extending and collapsing like an extension ladder, a multipurpose ladder can serve as an A-frame ladder, an extension ladder, scaffolding or a 90-degree ladder (for getting close to walls). By adjusting the length of each side independently when in the A-frame mode, a multipurpose ladder can even provide access over uneven ground such as a staircase.

In recent years, a wide variety of ladder manufacturers have employed a similar design into their own product lines. For example, Hercules Ladder Systems' Model LS1A45H creates a height-adjustable stepladder, stairway ladder and 22-foot extension ladder. Join the outer sections together and create two scaffolding trestles. Hercules is the first manufacturer to include stainless steel, automatically-locking hinge-locks on all of its Type 1-A, Extra Heavy Duty models. Hercules ladders also feature exclusive "I-Beam" box channels and a patented anti-twist

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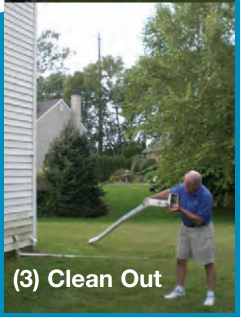

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*The latest redesign of the Little Giant multi-position ladder features LiteWave material technology for superior strength with 20 percent less weight.*

system for extra rigidity (www.herculesladder.com).

In the meantime, the Little Giant Ladder Company has been focusing on how to make a good thing better. Most notably, the company has recently upgraded its original multi-position design with LiteWave material technology, which utilizes the same proprietary alloys and processing techniques used in many of the military's aircraft in development. The result is a rock-solid ladder that weighs 20 percent less than competing multi-use ladders (www.littlegiantladder.com).

## TELESCOPING LADDERS

A clever and compact approach to a collapsible ladder is the telescoping ladder. Much like an actual telescope, the side rails of telescoping ladders are constructed of tubular design that automatically lock in place at 1-foot increments, providing multiple sizes in one small package. A telescoping ladder is basically a "ladder in a box" that combines strength with portability.

The *EHT* staff recently tested the brand new Xtend & Climb 780P Pro Series, Type 1A, rated for 300 pounds. Constructed of aerospace-engineered 6061 alloy, the ladder extends from a compact 2-1/2 feet to 12-1/2 feet, replacing a 16-foot extension ladder. As a safety feature, the ladder rungs include an angled thumb release mechanism with red or green indicators that tell you when the ladder rungs are securely locked in position. The 780P Pro Series includes an integrated carry handle, and a canvas carrying bag is also available (www.xtendandclimb.com).

*The Xtend & Climb 780P telescoping ladder extends from a compact 2-1/2 feet to 12-1/2 feet.*

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## TRIPOD LADDERS

Tripod or “orchard” ladders have long been used in the fruit tree industry because of their inherent stability when used on uneven terrain. For the same reasons a camera tripod has three legs, a tripod ladder has one less leg to keep in plane so the ladder stays level. That makes it much easier to position the three points of contact so the ladder—and the user—stand securely upright even when the ground is sloped or hilly. These days, tripod ladders are gaining popularity with homeowners not only for picking fruit and pruning trees, but also for general landscape maintenance and even work inside the home.

Stokes Ladders, Inc., recently added several new innovative features to its line of aluminum tripod ladders. Made of high-strength structural aluminum, standard features include a wide base for stability, comfortable 3-inch deep, non-skid steps and a shoulder pad at the balance point for easy carrying. A solid red warning step reminds users of safe climbing levels.

Traditional orchard ladders are designed for use on softer soil and depend upon slight soil penetration to

*Stokes Ladders offers a full line of tripod “orchard” ladders that provide inherent stability when used on uneven terrain.*

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hold the ladder in its setup position. These models should not be used "as is" on hard or slippery surfaces. However, Stokes offers an optional Hard Surface Kit consisting of non-skid rubber pads, rubber feet and aircraft cable to keep the third leg from sliding out too far (detachable for use over tree limbs), which makes the tripod ladders much more versatile for outdoor and indoor work. Plus, an optional Telescoping Third Leg allows the ladder to be used on steeper slopes, terraced gardens and even staircases (www.stokesladders.com).

## HANDY TOOL STORAGE

Increasingly common among ladder manufacturers is the trend of integrating tool storage into the actual ladder. The top working platform may offer drawers or trays for fasteners, or holes and clamps to hold power tools or paintbrushes. For instance, Louisville Ladder's new PRO TOP for Type IA Fiberglass Extension Ladders includes a non-conductive work tray, made of molded copolymer with tool slots to hold pliers, screwdrivers and more, as well as a tray with a large hole that allows placing a cordless drill chuck, hammer, etc. There's also a stepladder version with a magnetic tray to hold screws, nails and other fasteners.

LOUISVILLE

*Louisville Ladders' PRO-TOP ladders feature integrated storage for tools, materials and other supplies.*

Or, you can use a wide range of standalone accessories to keep tools and supplies close at hand. The *EHT* staff often uses the Professional Ladder Utility System (PLUS) accessory kit from Creative Sales Company. The kit clamps directly to the ladder frame and contains a tool bucket, paint tray and universal tool holder (www.proladdersystem.com).

Another option is the new Belt Bucket paint accessory from PBP Industries. The Belt Bucket is a sturdy bucket that attaches securely to the waist with a belt, and features a convenient clip to hold a paint brush or mini-roller. It also includes a disposable, replaceable liner for quick change of paint color and easy cleanup (www.beltbucket.com). **EHT**

*The new Belt Bucket is a sturdy bucket accessory that attaches securely to the waist with a belt, and features a convenient clip to hold a paint brush or mini-roller.*

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# Selecting Energy-Efficient Replacement Windows

SIMONTON
Reflections

**By Kathy Ziprik**

When it came time to replace the old single-paned, metal-framed windows in her home near Ocala National Forest in Florida, Dr. Anna Marie, health specialist for The Weather Channel, researched energy-efficient glass options.

"The added incentive of the government's tax credit for replacing old windows with highly energy-efficient windows made me focus on the windows as a priority in the renovation," says Dr. Anna Marie, host of the nationally-syndicated "Your Life with Dr. Anna Marie" television show.

"We're transforming an old home into an eco-friendly, energy-efficient and healthy home. The windows play a major role in this endeavor. As soon as the Simonton vinyl windows were installed I noticed a dramatic change.

"The sound reduction from the exterior into the home was amazing. And, even under construction with holes in the house everywhere, there was a noticeable drop in the interior temperature during the heat of the day. The energy efficiency features started working the minute these windows were installed."

One of the best aspects of the windows is that they qualified for the government's $1,500 tax credit available to all homeowners in 2009 and 2010.

## SAVING ENERGY

Thanks to the American Recovery and Reinvestment Act of 2009, when taxpayers purchase replacement windows that meet specific energy efficiency requirements, they are eligible for up to 30 percent of the amount of the windows purchased, returned as a tax credit. This credit is capped at $1,500 for the years of 2009 and 2010.

The law has some very specific restrictions that all homeowners should understand. These include:

**1.** Windows purchased must be equal to or below a U-factor of 0.30 and a Solar Heat Gain Coefficient (SHGC) of 0.30.

**2.** The purchase of the qualified windows must be made during the taxable year for which the credit is being claimed.

**3.** The credit is only allowed on the price of the qualified windows themselves, not on installation costs, on-site preparation, assembly or sales tax.

**4.** The tax credit is allowable only for qualified window units placed in service in 2009 and 2010.

What exactly is a tax credit? Unlike a tax deduction that only reduces the amount of your taxable income, a tax credit reduces the amount of tax you owe to the government.

## UNDERSTANDING 0.30/0.30

One of the key aspects of gaining this tax credit is the 0.30/0.30 requirement, which is more stringent than Energy Star

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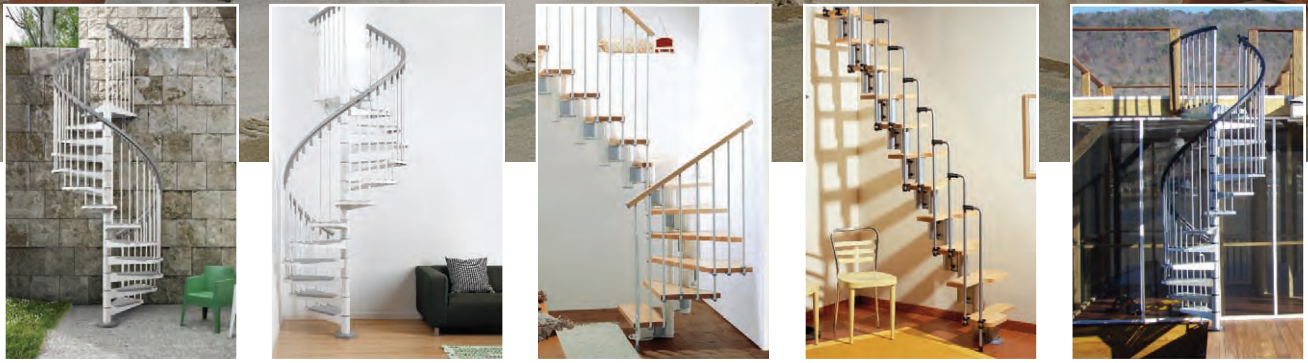

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qualifications for windows in many geographic areas. For that reason, it's important to understand the energy-efficient aspects of a window.

The U-factor for a window relates to the amount of heat transferred through a material. Basically, how much sunlight can penetrate your glass and enter the home. The lower the U-factor, the slower the rate of heat flow and the better the insulating quality of the window.

The Solar Heat Gain Coefficient (commonly referred to as the SHGC) represents the percentage of heat gained from both direct sunlight and absorbed heat. The smaller the number, the greater the ability to reduce solar heat gain into the home.

"By having an SHGC of 0.30 or lower, a replacement window is helping your home remain comfortable inside, regardless of the outside temperature," says Christopher Burk with Simonton Windows. "This, combined with a U-factor, reduces the amount of energy required to warm and cool your home during different seasons.

"The government is offering homeowners this incentive to make homes more energy-efficient. That's great news for all of us because energy-efficient replacement windows immediately help reduce energy bills from the day they are installed. And, these same windows add

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## ENERGY TAX CREDIT GLASS PACKAGES

To make identifying a qualifying window package easier for homeowners and remodelers, some window manufacturers have developed special product lines and web sites. One example is the Simonton Windows Energy Tax Credit (ETC) glass packages. Every window specified with these glass packages is guaranteed to be eligible for the tax credit.

Since homeowners in different geographical areas (such as coastal areas versus mountain regions) may wish to have different levels of qualifying glass packages, Simonton offers the following:

- The ETC Starter glass package includes a 3/4-inch IGU, Intercept® Spacer System, Argon gas fill and ProSolar™ Soft Coat Low E glass.
- The ETC Starter 366 glass package includes a 3/4-inch IGU, Intercept® Spacer System, Argon gas fill and LoE$^3$-366® glass.
- The ETC Super Solar glass package includes a 7/8-inch IGU, Super Spacer® System, Argon gas fill and ProSolar™ Soft Coat Low E glass.
- The ETC Super 366 glass package includes a 7/8-inch IGU, Super Spacer System, Argon gas fill and LoE$^3$-366 glass.
- The ETC Super Solar SBP glass package for StormBreaker Plus® windows includes a one-inch IGU, Super Spacer® System, Argon gas fill and Low E glass on one surface with impact-resistant glass.
- The ETC Super 366 SBP glass package for StormBreaker Plus® windows includes a one-inch IGU, Super Spacer System, Argon gas fill and LoE$^3$-366 glass on one surface with impact-resistant glass.

## WHAT TO KNOW

Once a homeowner has purchased the windows, it’s important to save the receipt for the window purchase for tax purposes. The cost of the windows themselves should be shown separately from the installation costs on the invoice. In addition, homeowners should save all the window labels that come with every window, especially the National Fenestration Rating Council (NFRC) label. Homeowners should also request a manufacturer's certification statement to authenticate that the window(s) purchased meet the qualifications for the tax credit.

People purchasing qualified windows in 2009 can submit to receive a tax credit on their 2009 taxes. Those purchasing qualified windows in 2010 can submit to receive the tax credit on their 2010 taxes. More details and information are located at www.simonton.com/taxcredit.

## ONE FAMILY'S STORY

In Sugar Land, Texas, the Jones family discovered the value of energy savings firsthand this past summer. The winners of the "Energy Savings Makeover" project organized by Houston KSEV radio show host Gary Parr, the family was chosen to receive a new HVAC system, tankless water heater, programmable thermostat, insulation, solar attic fans and other energy-efficient features. One of the largest benefits of the makeover was gaining new ETC glass package replacement windows.

"We selected this home because it represented a typical Houston area house that could truly benefit from an energy savings makeover," says Parr. "This family of six used to spend more than $900 a month on energy bills during the summer. That's because the home had little insulation, an inefficient HVAC system and old, single-paned aluminum-framed windows. Some of the windows were blocked to keep the sun's powerful rays from baking the interior of the home. Other windows were inoperable, so the home didn't have enough ventilation."

The Jones's 2,800-square foot, two-story home was built in the late 1970's. The original windows had clear glass with no energy-efficiency benefits, so that the family's air conditioning system worked continually to cool the home. To rectify the problem, the 20 old windows were replaced with Simonton's ETC glass package replacement windows.

"Poorly-insulated windows can result in hefty energy bills, faded carpets and furnishings, and an uncomfortable living environment," says Parr. "With the energy-efficient Simonton windows we installed in this home, we saw an immediate savings on the energy bills and a distinct improvement in the living quality of the home. This is the kind of home improvement project that homeowners nationwide can do to save on immediate energy bills and on the tax credit from the government." **EHT**

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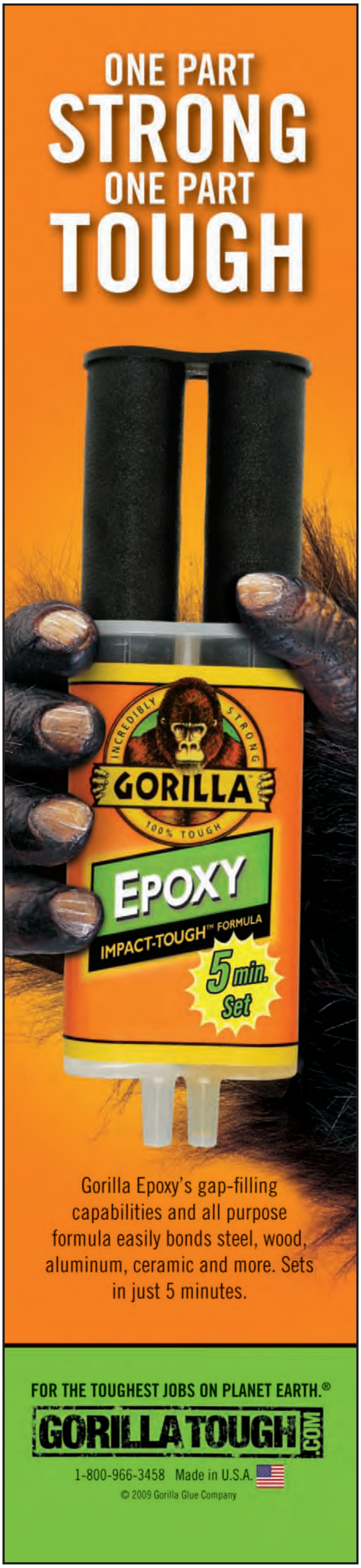

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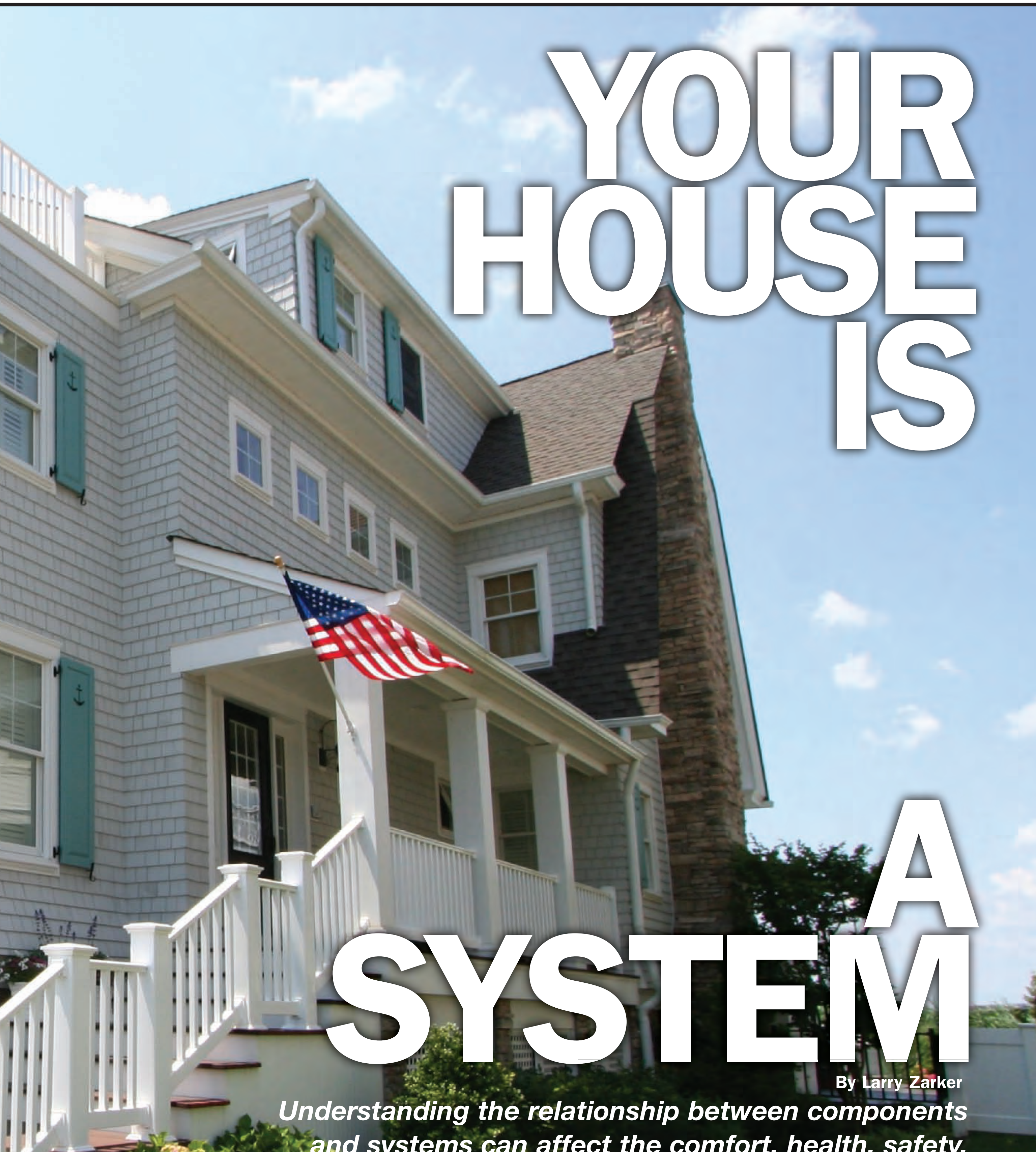

# YOUR HOUSE IS A SYSTEM

By Larry Zarker

*Understanding the relationship between components and systems can affect the comfort, health, safety, durability and energy efficiency of your home.*

# YOUR HOUSE IS A SYSTEM

You understand that your car is made up of interacting components and systems—when one component fails, it affects the performance of the entire vehicle. But did you know that the same goes for your house?

High energy bills, uneven temperatures from room-to-room, drafts, moisture, mold, mildew, poor indoor air quality, ice dams, pest infestations, seemingly uncontrollable humidity levels and even premature deterioration of building materials can all be the result of a breakdown in the relationship between the systems in your house. Often what seems like the obvious culprit—a prime fix for a competent do-it-yourselfer—is not actually the root cause. That obvious fix can not only fail to solve the original issue, it can actually put more strain on the relationship and compound the problem—or create a whole new set of problems.

To get it right, you need to consider the whole home using the house-as-a-system concept.

## HOW HEALTHY IS YOUR RELATIONSHIP?

There are three main systems that impact energy, comfort, health and safety: the building envelope (also called the building enclosure or shell), the heating, ventilation and air conditioning (HVAC) equipment and the occupants.

The building envelope consists of the roof, exterior walls and foundation of the house. Its role is to separate the indoor living environment from the outdoor elements. It blocks wind, rain, heat and cold, protecting the interior of the house and its occupants.

The HVAC provides comfort conditioning intended to make the living space enjoyable. It provides heat in winter, and for those who have air conditioning, cool in summer. It also circulates fresh air and regulates humidity levels.

The third system—the occupants—can affect the performance of the home by their behavior. Just living in the house has an impact, although some habits have more effect than others.

Unless you live in the most temperate and consistent of climates, the envelope will not keep you comfortable on its own. And if there is a problem with the building envelope, the HVAC cannot properly perform its comfort conditioning function. Additionally, if the occupants crank the thermostat and then leave the windows wide open, or place furniture or belongings over the registers and cold-air return vents, the HVAC doesn't stand a chance.

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*The building envelope works in conjunction with the HVAC system to maintain a comfortable temperature and humidity level inside the home. Photos courtesy James Hardie*

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# YOUR HOUSE IS A SYSTEM

Here's a scenario … You're uncomfortable so you reach for the thermostat, but the HVAC still can't keep up. Your energy bills get higher. You notice condensation on windows. You find mold in the basement. The attic is damp and you worry about warping and rot. The kids seem to catch one cold after another. If your house were a car, the 'check engine' light would be blazing and mysterious rattles would be coming from under the hood.

So you spend money and a weekend or two putting in more insulation. The problem gets a bit better, but it isn't solved. You look at the condensation and wonder if you should get new windows. You install a new thermostat and think about replacing the old furnace with a high-efficiency model. You take the kids to the pediatrician for another round of antibiotics. Meanwhile, you're still uncomfortable and your energy bills are still way too high.

The 'process of elimination' strategy to home-performance repairs can cost a lot of money and time without ever achieving the goal of a comfortable, healthy, safe and energy-efficient home. The alternative is to conduct a whole-home assessment to find those relationship problems and tackle them at the root cause.

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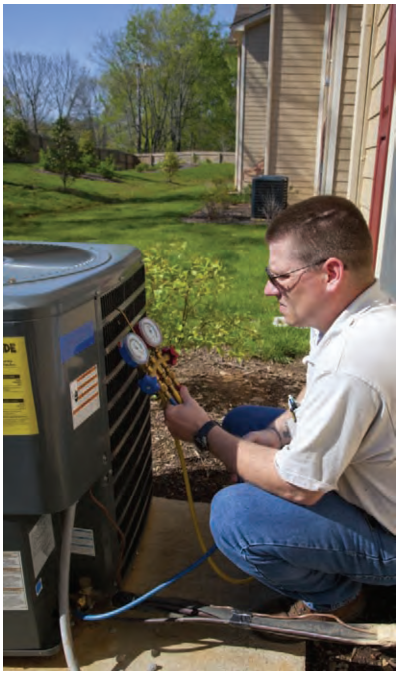

*The HVAC heats, cools, circulates fresh air and regulates humidity.*

One of the most common relationship problems between the envelope and HVAC is “uncontrolled” air leakage through the building envelope. In this scenario, that indoor air you pay to heat and cool escapes through gaps, cracks and holes in the building envelope. It’s “uncontrolled” because all the windows and doors (the intentional holes in the envelope) are shut and air is still escaping. The U.S. Government’s Energy Star program estimates uncontrolled air leakage can waste as much as 30 percent of the energy used to heat and cool an average American home. Another common problem is leaky ducts in forced-air HVAC systems. In a typical house, about 20 percent of the air that moves through the duct system is lost due to leaks, holes and poorly connected ducts, according to Energy Star.

*Installing a programmable thermostat is an easy place to start optimizing your energy efficiency.*

## FINDING THE PROBLEMS

A comprehensive whole-home assessment is best performed by a trained and qualified technician for two reasons:

1) Properly diagnosing home performance problems and prescribing solutions requires a background in specialist building science that most DIY’ers just do not have.

2) The job requires specialist (and often expensive) diagnostic tools—such as a pressurization blower door and infrared camera—that are not likely to be found in the average DIY tool kit.

What you can do to prepare for the comprehensive assessment is conduct an initial audit of your own. Start by writing down all the symptoms, including when and where in the house you notice

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them most. Make a list of any work that's been done and when it was done—for example, you might note that you installed new insulation last fall, or converted the deck to a sunroom three summers ago, or changed from a window A/C to central air five years ago.

Pull together all your energy bills for the last year (the farther back you can go, the better) and look for usage patterns or changes that correspond with the symptoms, the previous work, or both. Double-check the age and rating on your HVAC equipment and household appliances and be sure you know the fuel types for each.

Walk through your house and look for clues—taking pictures as you go if you have a camera. Are there damp spots? Is dust collecting or is the carpet looking dirty near the baseboards? Is the snow melting in a weird pattern on the roof? Does the furnace make a funny noise or produce a strange smell when it's running hard? Is one room particularly hot or cold? Which windows seem to carry the most condensation?

When you present your findings to your specialist home performance contractor, he or she should listen carefully, take good notes and ask follow-up questions as part of the homeowner interview before starting the physical assessment. They'll probably also evaluate your energy bills and ask some questions about that third system—the occupants and their behavior—either before or after the physical audit.

The comprehensive assessment will start with a thorough walk-through—both indoors and out. The technician may use an infrared camera to get a visual on temperature differences in different areas, conduct a blower door test to depressurize the house to assess air leakage levels, and test for leakage in the duct work of forced-air HVAC systems. They may also perform other function and safety tests on HVAC equipment, including carbon monoxide levels and combustion back-draft testing.

At the end of the comprehensive whole-home assessment, your home performance contractor should be able to provide you with a scientific, objective

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view of the situation. They should be able to help you prioritize repairs in order—from must-do to nice-to-do—so you can solve the biggest problems without making smaller problems worse. They should also be able to guide you regarding which fixes are suitable for your particular DIY skill level, and which will require expert help—either from the contracting company who performed the assessment or from another qualified, trained source.

## SHOW ME THE MONEY

Upgrading your home's performance can increase its value and provide great rewards in terms of comfort, health, safety and energy savings. But it can also require an investment of

*One of the most common relationship problems between the building envelope and HVAC is air leakage through gaps and cracks in the walls, ducts, roof and foundation.*

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money, time, or both. It's worth investigating Federal, State and local homeowner incentive programs—many of which now offer increased funding thanks to the economic stimulus package introduced in February of 2009. You can visit the Database of State Incentives for Renewables & Efficiency (DSIRE) at www.dsireusa.org and click on your state on the map to find out what's available in your area. You can also find a state-by-state index of participating Home Performance with Energy Star programs at www.energystar.gov.

Just be aware that many of these incentive programs will need you to register before your initial whole-home assessment is done, and then have another whole-home assessment performed after all the work is completed to ensure it was completed satisfactorily to the levels required by that specific program. Some programs also require the assessments and work be performed by contracting companies with specific qualifications, such as Building Performance Institute Certified Technicians or Accredited Contractors.

Understanding how your house works as a series of interconnected systems can help you identify the root cause of problems and find solutions to improve the comfort, health, safety, durability and energy efficiency of your home. **EHT**

……

***Editor's Note:*** *Larry Zarker is the CEO of the Building Performance Institute (BPI), an independent, not-for-profit organization committed to the improvement of home performance via training, certification, accreditation and quality assurance programs for residential contractors and their customers. Learn more at www.bpi.org.*

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# COAT OF ARMOR FOR OUTDOOR WOOD

*Protect and beautify your exterior wood with a quality preservative. Here's a look at the type of products available and some tips on how to apply them.*

**By Matt Weber**

From fences and furniture to decking and siding, wood is one material that can be used for nearly anything related to the home, but requires some tender loving care to keep it looking good as new. The rule of thumb to protect your exterior wood is to clean and prep the surface, and then go to town with your preservative of choice. *EHT* takes a new look at some of the basics of exterior wood care, advances in wood-finish technology, and how to get the most from your topcoats.

## PREP STEPS FOR OUTDOOR COATINGS

The primary reason to coat an exterior wood structure is to repel water. Although lumber is often treated to resist insects and decay, they're still vulnerable to moisture. Moisture can cause wood to shrink and swell, stressing the fibers and causing the boards to warp, cup, split or splinter. Sealing the surface with a water-repellent finish can help prevent this and preserve wood for years.

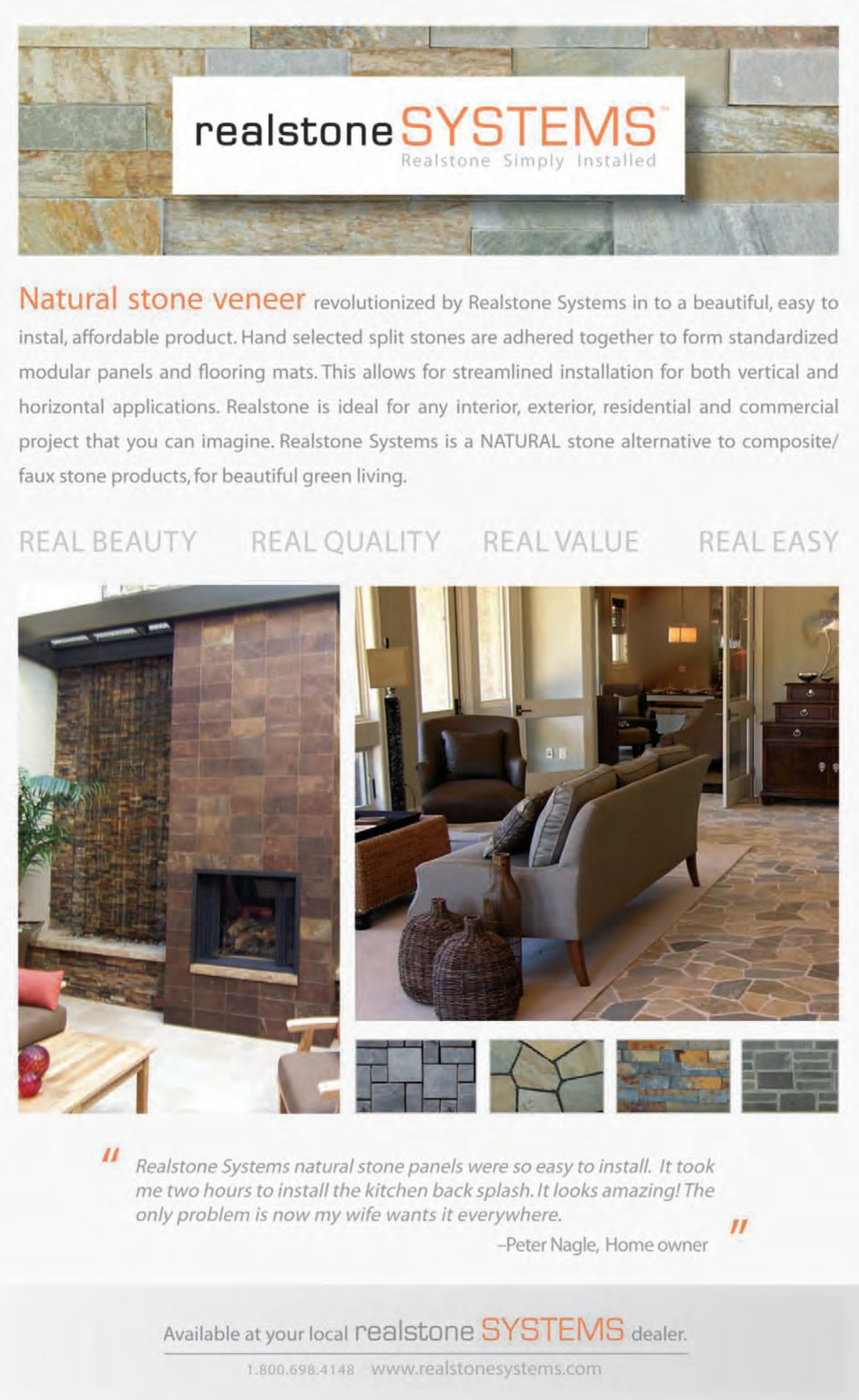
The sun is another problem. The sun constantly radiates ultraviolet rays that gradually damage the wood at a microscopic level. Although clear seal coats are readily available as water repellent options, adding a pigment such as a wood stain can help protect the surface from this UV blast and fight the wood's natural tendency to turn gray. But just like everything else in life, regular maintenance is critical.

If your deck, fence or pergola is old and gray, the surface should be prepped before using a new finish. Remove any mildew, dirt, old coatings, etc. The old-fashioned way is to hand-scrub with a stiff synthetic-bristle brush. Is there a stain or sealer currently on the wood? Prep gray or clear-coated wood using an off-the-shelf wood cleaner with a base ingredient of sodium hydroxide. Depending on the condition of the wood surface, even sanding is a good idea. However, power-sanding will close the pores of the wood, which can prevent the new stain from penetrating properly. So if you choose to sand, you should follow up with a good wash to re-open the pores.

In some cases, a chemical stripper is essential for creating an even surface to which the new sealant can adhere. Check into the new biodegradable strippers that are safer, easier to use, and cut down on the harsh fumes of traditional strippers. If the high-traffic areas of your deck have worn down, but there is still sealant remaining in other areas, strip the entire deck before re-staining. Stripping is also important when changing colors. Leftover traces of an old pigment can affect the way a new color appears.

Once the wood is scoured, and stripped if necessary, then apply a deck-cleaning product with oxalic acid to brighten the wood. Just follow the directions on the product label. It's a good idea to let the cleaner chemically agitate the surface for a few minutes (don't let it dry), because some water-borne stains are tough to remove. The deck-cleaning solution may be followed by power washing at 500 PSI—but be careful. Too much pressure can cause the power washer to damage the wood, causing the surface to "fuzz." Use only a low-pressure nozzle and work the water stream with the grain and never

*Brushing is critical to work the preservative into the wood grain.*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against it, which can damage the surface.

For new decks, many professionals recommend that new wood be allowed to acclimate to its new environment before staining. The wood needs a chance to release unstable sap, sugars and other residues, which take up space in the wood that the coating would otherwise occupy. Thirty days of seasoning is a minimum, but the duration also depends on the wood's condition when the deck was built, as well as the weather. New, pressure-treated lumber can be very wet, and it needs to be completely dry before staining, especially if using an oil-based product as a coating. Hotter, drier air temperatures will condition the wood quickly, but wet weather will prolong the process. Complete drying of "green" PT wood could potentially take up to six months.

## FILM-FORMING SEALANTS VS. PENETRATING WOOD STAINS

With prep work complete, it's time to choose your exterior wood finish. These fall into two major categories, based on how the product bonds to the wood.

A film-forming sealant bonds to the surface of the wood like paint or shellac. This protective film can provide a beautiful high-gloss furniture look, while still allowing the natural woodgrain to show through. These products form a very durable surface that prevents the wood from weathering. However, a high-quality sealant can be expensive, and while they look great, know that they will eventually have to be stripped off if refinishing the wood with a different product. Film-formers include many

*A quality preservative can help prevent cupping, warping and rot.*

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alkyds, latex-acrylics and varnish resins in oil- or water-based finishes. Pigments are added to the products to change the wood color and add UV protection. In the past, these film coatings have been known to crack as the wood expands and contracts during normal moisture cycling. However, in recent years technological advances have made great strides toward adding a high degree of flexibility and microporosity in these products, which prevents blistering and cracking and achieves a very handsome, durable satin finish. However, the best quality products are rather expensive at roughly $50 per gallon, but only require one coat to do the trick. Maintenance required for film-forming sealants is usually one coat every 18 months. However, eventually these sealants may have to be stripped before reapplication, because too many coats can result in discoloration.

The next major category is a penetrating stain with water repellent. Actually, the industry prefers the term "water-repellent preservative," because it has a preservative (mildewcide) that helps control mildew growth. Some products also contain ultraviolet light absorbers, stabilizers or blockers. Penetrating stains are available in both oil-based and

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water-based formulations. The resins penetrate wood pores to block out the damaging effects of weather while allowing the natural texture to shine through. These finishes offer pigment and protection, but there's no glossy coat on the penetrating stains.

A current trend among sealant manufacturers is to offer products with a combination of drying and non-drying oils that provide two layers of protection in one product. For example, with Armstrong Clark's Wood Stains, non-drying conditioning oils penetrate the wood fiber, rejuvenating the wood where the wood's natural oils used to be. The drying oils stay at the surface and create a matte finish that is dry to the touch.

*A Campbell Hausfeld airless sprayer saves time when staining a fence.*

There are quality products in both the film-forming and penetrating categories, and your choice may boil down to personal taste: a glossy furniture-like finish or a more rustic, natural appearance.

## WOOD FINISH: WATER VS. OIL

Based on all the questions we get at *EHT*, there seems to be a lot of confusion regarding water-based and oil-based finishes.

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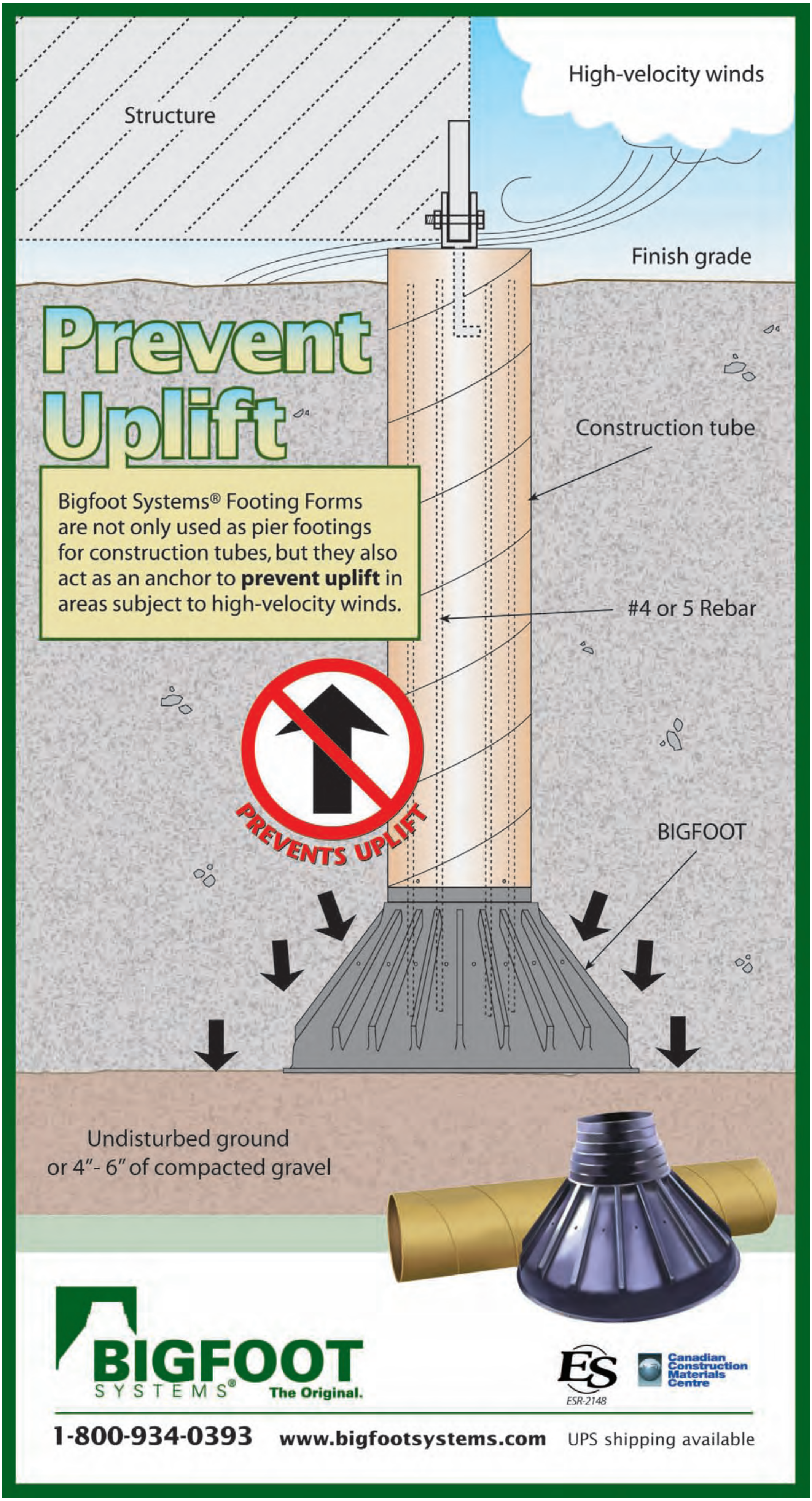
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# Tips for Installing Footings

Here are some useful tips to ensure your footings are installed properly and the integrity of your project is maintained:

- You should always make sure that a qualified engineer has designed the footing you are using and that it has been tested by an accredited evaluation firm.
- Select a footing that can carry the weight of your new construction and has met all the proper building codes.
- Ensure you are placing the footing form on solid ground. The more solid the ground the less likely movement will occur.
- Install your footings 4-6 inches below the frost line to avoid potential movement. If you are in an area without frost, the footing form should be placed two feet in the ground and then backfilled to hold it in place when it is being filled with concrete.
- Rebar is an important part of installation. Pour concrete into the footing system first, insert three or four number 4 or 5 rebar rods into the tube. To determine the length of rebar, measure the distance from the top of the tube to the air holes located on the Bigfoot Systems® Footing Form before you place the system in the excavation and backfill.
- Don't risk having to redo the job, do it right the first time!

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The science behind the difference in finishes requires a course in chemistry, but in a nutshell it has to do with how the chemical particles of the product bond during the curing phase. Most water-based finishes have tiny particles of pigment and resin that adhere to each other very tightly as the finish dries, similar to a patchwork quilt. With oil-based finishes, the tiny particles actually fuse chemically together into one large sheet-like substance, which achieves a harder finish and is less likely to amber. Examine the product's label for clues to the coating's quality, keeping an eye out for anything that mentions "non-yellowing" properties.

Water-based finishes are generally heralded for their ease of use. Compared to oil-based formulas, they are easy to clean up, have a lower odor and are often less expensive. However, most water-based coatings require more coats and still don't last as long before requiring re-application, when compared to their oil-based or "alkyd" counterparts.

Note: You'll often see "alkyd" written on cans at the paint store. Alkyd coatings are a class of polyester coatings derived from the reaction of an alcohol and an acid or acid anhydride. The term alkyd is derived from "alcohol and acid, or anhydride" and refers to the dominant resin used in most oil-based coatings.

Although oil-based finishes are usually the more expensive option, the bottom line is that when compared to water-based coatings, the oil-based variety almost always outperforms them. Oil-based coatings provide more long-term, wood-preserving durability.

I should note some exceptions to this "water versus oil" rule. Some high-quality waterborne products have come a long way in recent years. These advanced waterborne finishes are formulated with water-reducible synthetic resins, and they bond like super glue for much better performance than other water-based finishes. Saver Systems, manufacturer of the Defy-brand wood

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Duct tape is made up of three main ingredients plastic film, cloth and adhesive. It is all petroleum based, even the cloth is polyester. We know how harmful petroleum is to our environment so we decided to clean up our act. **Eco Tapes** components are made a little different but with the same intention of giving our consumer a tool to make those essential repairs, while helping the environment, without spending a lot of money to make a difference.

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Krylon offers the first exterior wood stain available in a spray can.

stain, even offers a product fortified with epoxy resins, which is not a food source for mildew and algae like natural resin (oil-based) stains are.

## COLOR OPTIONS

There are three main decorative options for deck finishes: clear, semi-transparent and solid (opaque) in a wide range of colors and tints. Older wood with a more weathered surface might need an opaque stain to cover imperfections. These solid stains, which coat the surface like paint, are the only variety to hide the grain and will also wear more slowly. However, once they do wear, the damaged finish will be very evident because the natural wood color will show through the otherwise colored finish. The wear from foot traffic is particularly noticeable with a solid stain, making them more suitable for vertical surfaces such as railings and pillars rather than floors and stairs. Using solid stains in a combination of bold colors and tones can create a unique artistic look.

Clear or semi-transparent coatings are popular options, particularly when the wood is new and worthy of showing off. Clear coatings will help protect from moisture and insects, but the wood will still weather to gray beneath the sun's UV ray exposure. A semi-transparent stain with a UV-blocking pigment will help prevent this while also tinting the surface with a healthy, natural looking tone.

## COATING APPLICATION

Not all coatings are applied the same way, so follow the instructions on the can. Usually a good oil-based stain can be brushed on, rolled or sprayed. Even a 12-inch car wash brush works well for large decks. Most pros would agree that brushing is best because the filaments thoroughly work the finish into the wood grain. Work wet; keep your coating moving and don't let a spot sit and dry.

For very large jobs, such as staining siding or a fence, the fastest, most efficient method is to use an airless sprayer. For example, the *EHT* staff recently used Campbell Hausfeld's new Extreme-Duty airless sprayer to

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coat a shadowbox privacy fence. An airless unit draws stain or paint directly from a paint canister and sprays at pressures up to 1,700 PSI. After completing the project, our staff estimates that spraying the coating was roughly 10 times faster than brushing alone. However, even when spraying, you should back-brush the stain into the wood grain to catch any runs and achieve the most thorough coverage.

One interesting new development in stain application comes from Krylon, known primarily for its extensive line of spray paints. Krylon exterior wood stain is the first and only exterior wood stain that comes in a spray can. Apply it with short even bursts for a smooth, durable finish that will hold up under tough outdoor conditions. Ideal for small to medium-sized projects, the Krylon stain protects against UV protection and repels water. Plus, it comes with an adjustable nozzle that can be oriented for horizontal or vertical fan spray, or any angle in between.

When applying any wood stain, the number of coats will depend on the product you've selected. With some coating systems, the overall finished appearance relies on the buildup of successive coats. Other products require only a single base coat, with further coats added to darken the tone. Also, check the label for weather-related instructions. Always avoid wet weather when applying, and most oil-based products should not be applied in direct sunlight. Although, one exception is the Armstrong-Clark line of coatings—the only oil-based coating that can be applied in direct sunlight and the heat of the day. **EHT**

*Editor's Note:* Thanks to Alan Broom of ShineBrite, LLC, for help with this article. www.shinebritellc.com

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# LAYER

# UP

## Installing underlayment for sheet vinyl flooring.

**by Larry Walton**

There are plenty of reasons to install sheet vinyl flooring, not the least of which is cost savings over other flooring materials. Vinyl flooring is available in a huge number of patterns and colors, is easy to clean and is softer to walk on than most other hard surfaces. Because you can install sheet vinyl over existing vinyl, it offers the option of changing design without breaking the bank.

Vinyl flooring is usually not installed directly over the subfloor in residential applications. In most cases 4-by-8-foot sheets of particle board or plywood must be installed in preparation for the vinyl floor install.

One of the big considerations when installing different types of flooring in the home is getting the finished elevations to match. Cement board, thinset and tile add up to about 5/8 inch. Traditional hardwood flooring is 3/4-inch thick and carpet with pad is usually between 5/8 and 1 inch, depending on the type. Sheet vinyl, however is only about 1/16-inch thick. It needs to be built up to the same elevation of the other flooring types in the house. The thinness and softness of sheet vinyl requires that it be installed on a surface that is very flat and smooth. Installing underlayment in the vinyl areas supplies the elevation, smoothness and levelness necessary for the proper installation of vinyl floors.

### PARTICLE BOARD

One common underlayment for vinyl floors is 1/2-inch particle board. It's inexpensive, flat, smooth and bonds well to the vinyl adhesives. On the downside, particle board underlayment has very little structural strength. In fact it must be supported by a strong subfloor with limited gaps and it can bridge only small holes.

Another weakness of particleboard underlayment is that it really doesn't like water. It soaks in water like a sponge. Water makes it swell unevenly, which causes bubble-like irregularities in the surface. Add enough water and the particle board will fall apart. So, in areas prone to water exposure, don't use particle board.

## PLYWOOD

Another common underlayment material is plywood, which has an advantage over particle board in structural strength and water resistance. One concern with plywood, as a walked-on surface, is that voids in the interior veneer layers may allow a depression in the flooring if weight were concentrated in one spot, such as a big ol' girl wearing high heel shoes. I suppose that could happen, but it's not likely. If this is a concern, marine-grade and underlayment-grade plywoods will avoid the voids.

Plywood used as underlayment for sheet vinyl flooring should also have a sanded, smooth surface on the topside. Avoid using materials with distinct raised grain patterns, which can affect the finish texture of the sheet vinyl.

## CLEAN SWEEP

Don't overlook the importance of cleaning the subfloor before installing underlayment. Debris left on the subfloor can cause problems with the underlayment down the road. Whether your project is new construction or a remodel, the odds are pretty good some drywall joint compound (aka mud), construction adhesive or plaster is present on the subfloor from the wall finishing process. An uneven surface is not the only concern. These materials can break down over time, leaving a void between the underlayment and the subfloor. This void can allow noticeable movement, floor squeaks or cause fasteners to poke through.

We use a hand brush with stiff bristles around the entire perimeter to rake debris from under the drywall that could cause problems during the install. A thorough sweeping follows. Whoever does the sweeping should watch for nail and screw heads sticking up, as well as holes, large cracks, dry rot and other issues that may warrant subfloor repairs.

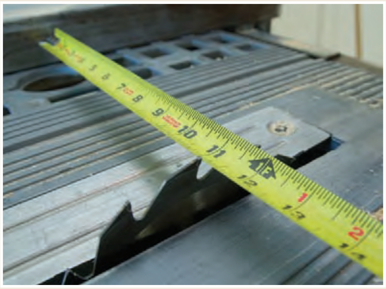
Some subfloor materials will soak in water and swell along the edges. Watch for this if your project experienced a lot of rain

*We use a stiff-bristle hand brush to get debris out from under the drywall.*

*Typical construction debris on the subfloor includes drywall compound, bits of insulation, expanding foam and drill debris from plumbing and electrical operations.*

## BIG CUTS/SMALL SAW

**You can cut a piece wider than the capacity of your small table saw by marking the desired width on the piece and measuring to the mark from the opposite edge. Set the saw to cut off the proper amount by measuring to the outside of the saw blade. This approach allows you to use the fence on the table saw for a nice straight cut even though the finished piece (on the other side) is wider than the saw's capacity.**



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*Like many of our home improvement projects, proper preparation is important to the success of an underlayment install.*

during the framing stage. The swelling results in ridges where the subfloor sheets come together. These ridges can create noticeable humps and bumps in the underlayment. They can also create voids between the underlayment and the subfloor, which can develop movement, floor squeaks and nail pops later.

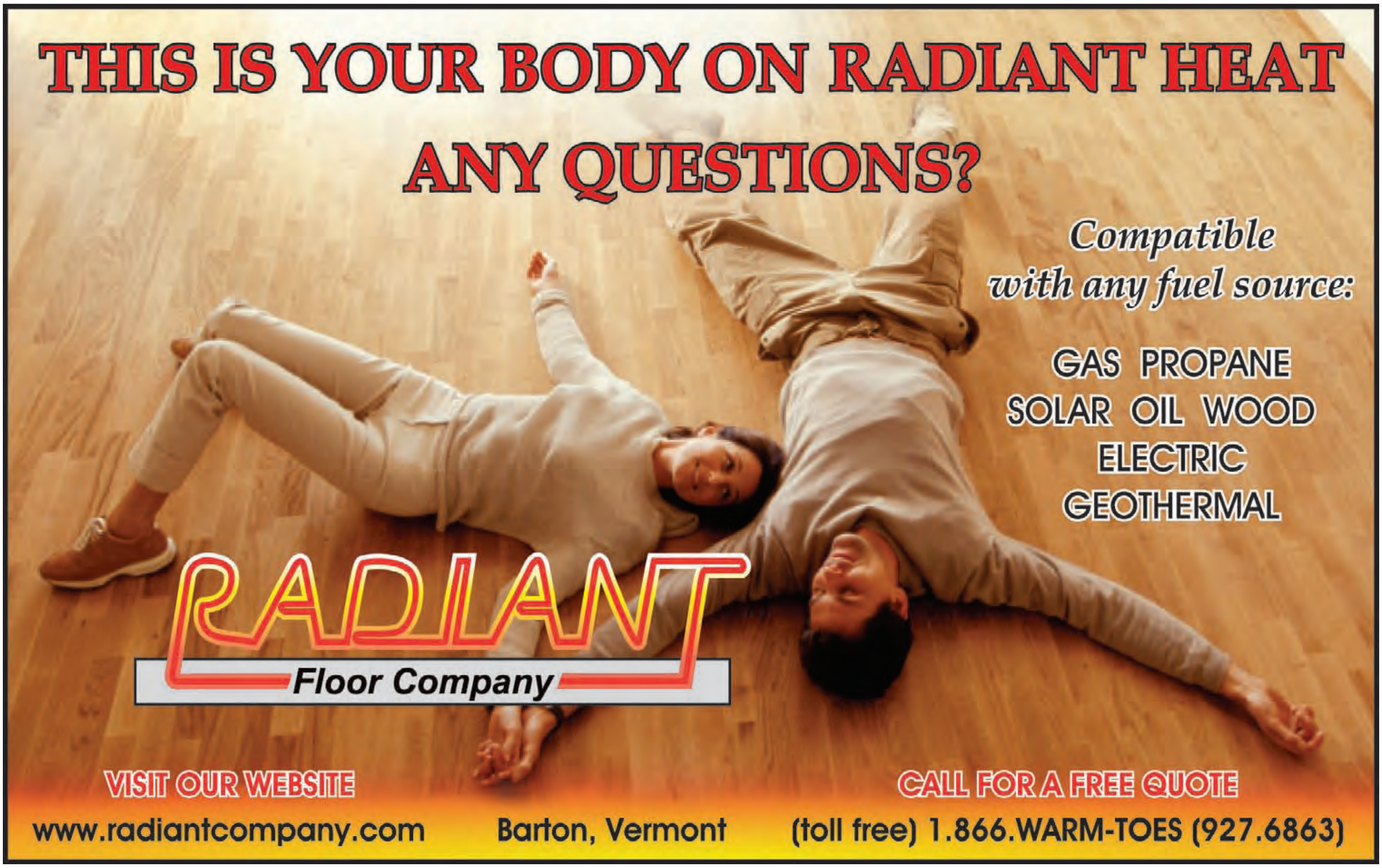
We usually handle ridges in the subfloor by setting nail heads with a large punch and grinding, power planing or sanding the ridges closer to flat. A hardwood floor sander works great for this task.

*We load our sheets of underlayment material on sawhorses for easy layout and cutting.*

## VAPOR BARRIERS

Moisture content in the subfloor should be low before installing underlayment. In some cases a vapor barrier should be used between the subfloor and the underlayment, particularly for first-floor applications when using particle board underlayment over a subfloor other than exterior-grade plywood.

If a vapor barrier is not required by code, you need to decide if the subfloor provides



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## CORDLESS ADVANTAGE

One of the biggest advantages to cordless technology is being able to easily take the cutting tool to the room where a tricky piece needs to be cut for installation. Some underlayment pieces are like jigsaw puzzle pieces, which makes a cordless jigsaw an ideal tool to make the piece fit the puzzle.

Starting with a basic rectangular piece, you can mark your measurements directly onto the piece as you take them. This avoids the need to write down measurements or to draw a diagram. You can cut out openings*, make adjustments, and test fit your piece without ever leaving the room.

* Tim, you really should use a sawhorse for this operation.

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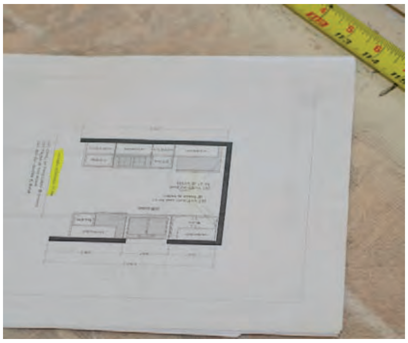
protection against moisture. If it's car decking (tongue-and-groove dimensional lumber) with gaps and knot holes, a vapor barrier is a good idea. Vapor barriers are usually polyethylene sheets (4 mil or thicker) or asphalt-layered kraft paper.

### FLOOR BREAKS

OK, your subfloor is ready, the material's been selected and protected with the proper vapor barrier and now you're ready to start running that new circular saw, right? Hold on there, Sawyer—you gotta figure out your floor breaks next.



*Determining the floor break in kitchen areas often requires a careful examination of the cabinet plan.*

Floor breaks are where the vinyl meets the carpet (or whatever other flooring is adjacent to the flooring you are preparing to install on your underlayment). The edge of your underlayment is the place where the vinyl and the carpet meet. If, for example, you are installing vinyl in a bathroom, you will want to make the floor break under the door going into the bathroom.

If the door swings into the bathroom, then the floor break will extend into the door opening about 1 inch from the face of the drywall inside the bathroom. If the door swings out of the bathroom (such as into an adjacent walk-in closet), then you'll extend the underlayment into the door opening until it is about an inch toward the bathroom from the inside face of the wall of the adjacent room. In other words, figure out where the door is and place the edge of the underlayment right under the center of the door panel.

*We use a T-square to mark underlayment sheets for cutting. Look in the drywall tool area to find a good T-square for your underlayment install.*

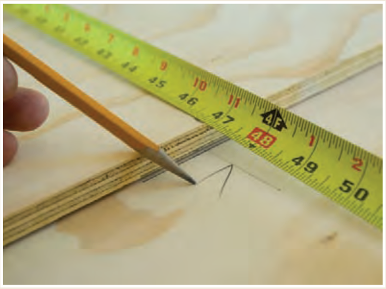
There are a few exceptions I make to this floor-break-under-the-door rule. One is in the case of bifold or bypass doors where there is vinyl on one side and carpet on the other. Because bifold doors tend to be a bit higher off the floor and bypass doors do not line up with each other, it's often preferable to have the floor break on the inside of the closet area where it is unlikely to be seen when

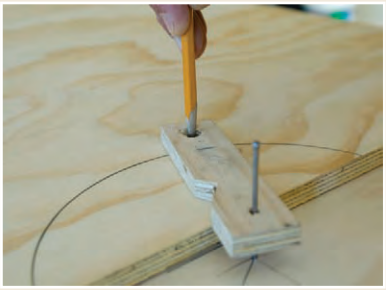
## OUT OF BOUNDS

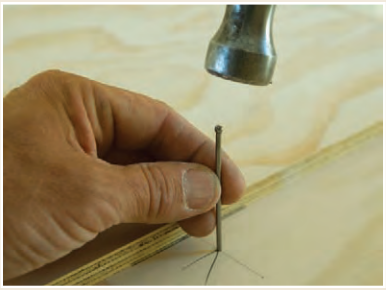
**When the center of a toilet drain falls outside of the sheet you are working on, you can extend the layout onto the sheet underneath and anchor your pivot nail there.**

**With the pivot nail in the sheet underneath, you can use your 3-1/2-inch radius jig to draw an arc for the toilet drain cutout.**

**Cut out the toilet drain opening with a jigsaw.**







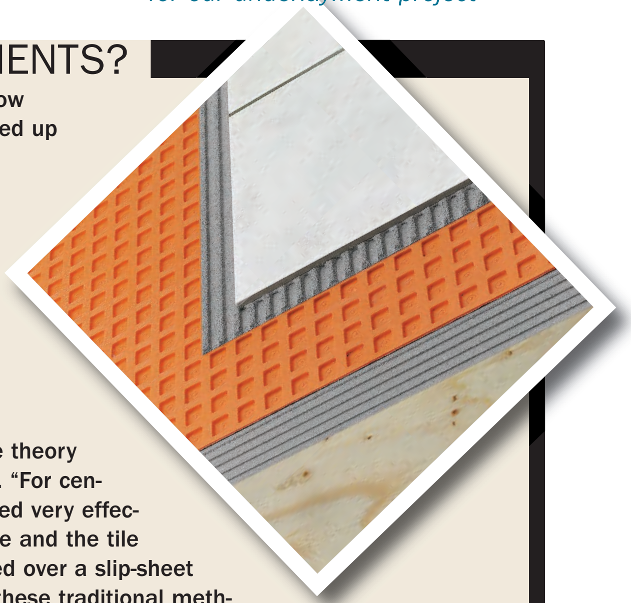
the doors are closed. Just imagine the flooring behind the doors peeking out into the living area and you'll make the right call.

When the floor break is in an open area such as a transition between a nook area and the living room, you'll have to decide how to make that happen so it looks best. If there is an archway or half wall on either side, it's generally preferable to split the flooring types in the middle of the dividing wall or arch or cased opening where there is no door.

*Set the depth of your circular saw to about 1/4" beyond the material thickness.*

*We used Porter Cable's new 18-volt Lithium 6-1/2" circular saw for our underlayment project*

## WHAT ABOUT TILE FLOOR UNDERLAYMENTS?



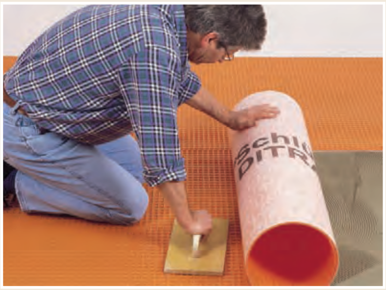
**Some tiled floors last for hundreds of years and others start to show cracks after only a few months. Why? The reason can be best summed up in one word—uncoupling.**

**An uncoupling layer allows the tiled surface to move independently of, or be 'uncoupled' from, the subfloor. In recent years many installers have been inappropriately working to create a more secure bond by adhering tiles directly to the subfloor. The problem with this "direct bond" approach is that the subfloor expands and contracts due to changes in moisture and temperature, which exerts incredible stresses on the tile layer. The tiles and grout don't expand and contract at the same rate as the subfloor, so tiles and grout are both vulnerable to cracking and buckling.**

**So, what about those 100-year old floors that still look great? "The theory is simple," says Peter Nielsen, technical director for Schluter-Systems. "For centuries tiles were successfully installed on a layer of sand, which worked very effectively as an independent uncoupling layer between the structural base and the tile floors. In more recent times, a thick wire-reinforced mortar bed placed over a slip-sheet was used to achieve this same function. Although highly successful, these traditional methods have the limitations of being thick, heavy and challenging to install, and they are not at all suited to modern home construction."**

**Schluter-DITRA is an uncoupling membrane engineered for modern construction techniques. DITRA is only 1/8-inch thick, weighs only two ounces per square foot and is easy to install. The matting allows construction materials beneath the tile to breathe, but it is impervious to water so floors and ceilings will not be damaged by spills and leaks. The system is designed for use on all of the most commonly used subfloor materials—plywood, OSB, concrete and gypsum-based screed.**

**The uncoupling membrane is adhered to the surface being tiled using a layer of thinset adhesive applied with a 1/4-inch V-notch trowel. The tile is then adhered to the uncoupling membrane using another layer of thinset. Also available is DITRA-XL, which is 5/16-inch thick to allow for even transitions between typical ceramic tile and 3/4-inch thick hardwood flooring. For more information, visit www.schluter.com.**



In the case of a kitchen or bar area, you need to know the cabinet layout so you can make the floor break at the edge of the outside cabinet box. If there are cabinets on both sides of the opening, plan the floor break to go in a straight line between the outside corners of each of the outside toe kicks.

*After notching the sheet so the floor break extends into the door opening, you can then layout other cuts as measured inside the walls.*

## SHEET ORIENTATION

Once you've decided on the floor breaks, you can measure, cut and install your underlayment. In most cases I begin with the biggest piece I can fit in a room (usually a 4-by-8-foot sheet) right in the door opening so you avoid putting seams in the areas that will be walked on most.

Whenever practical, run the long direction of the underlayment sheets in the opposite direction of the subfloor material so they cross each other. This adds to the floor's structural strength. Avoid placing sheets of underlayment in such a way that the seams of the underlayment correspond or line up with the joints in the subfloor.

*The preferred method for carrying a sheet of underlayment is one hand under and one over. This gives you good control to negotiate hallways and door openings.*

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If the floor break takes place in an area other than under a door, I prefer to lay the first sheets along the floor break edge and work back into the vinyl area of the room. This allows me to cut and fit the smaller pieces against the walls and under the cabinet areas where the tolerances are less demanding. Also, if you start with a nice straight factory edge along a carefully established floor break it will greatly improve the transition between flooring types.

## TOLERANCES

Whenever possible, plan your cuts so the factory edges of the

*Be careful not do damage walls and tubs as you maneuver sheets into place.*

## SPECIAL CARE FOR BASEMENT REMODELING

**When remodeling a basement into a living space, consider the advantages of an insulated subfloor to increase the room's comfort level. For example, concrete transfers moisture, so you should never install carpet or wood directly over the bare slab of a basement; they'll ruin in no time. Vinyl or linoleum flooring in a basement can transfer cold temperatures from the floor to the room.**

**One solution to warm, comfortable basement flooring is the Barricade Modular Subfloor from OvrX. Barricade is an insulated subfloor panel system specifically designed to cover concrete floors and provide warmth from real insulation. The system comes in 2-by-2-foot panels that quickly and easily intstall using a tongue-and-groove system. The OSB panels are 1.125 inch thick and backed with a layer of closed-cell polystyrene insulation achieving an R value of 3.**

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*Keep the piece on plane with the down edge parallel to the wall as you ease the piece into position. Check the piece for parallel to the walls before tacking it into place.*

underlayment come together, and place the saw-cut edges on the perimeters against the walls. Give yourself 1/8 to 1/4 inch of room along the walls. In fact, you can leave gaps the thickness of the base board. It's better to have a little wiggle room than to scratch up the walls.

*After establishing the floor break with the outside piece, add material to the inside of the room to complete the install.*

As you install the pieces, move them away from the wall and tighten the joints out "in the field." When the pieces fit and the joints are tight, tack them in place with a ring-shank nail or with the staple gun.

Leave a little room (1/16 inch or so) along fiberglass showers and tubs. Even a little floor flex can cause a squeak where the underlayment rubs these fixtures. If you are installing vinyl flooring in a large area where light from a patio door shines across the surface, it's a good idea to use carpenter's glue at the seams between pieces to ensure that they stay well connected to each other as well as to the subfloor.

Nailing patterns should be 3 inches on the perimeters and 6

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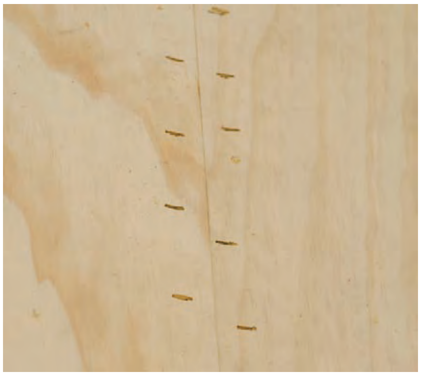
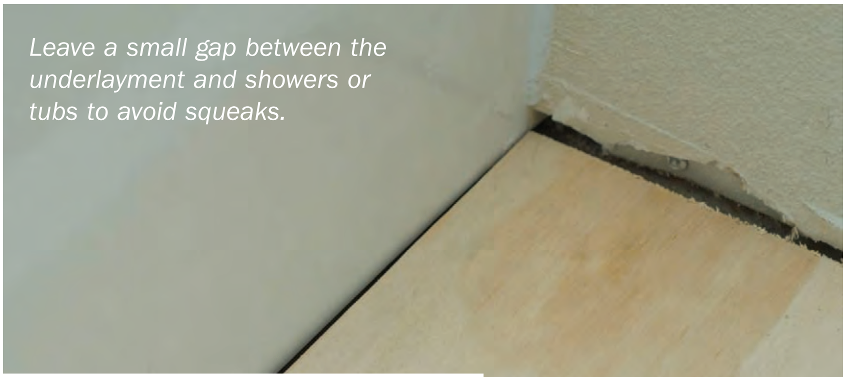
inches in the field. Before nailing off the pieces in the field, drive a few fasteners with plenty of weight near the nailing spot to make sure the underlayment is against the subfloor.

Proper preparation of the subfloor, careful consideration for



*Fastener spacing should be approximately 3” on the outside perimeter of each piece.*



*Leave a small gap between the underlayment and showers or tubs to avoid squeaks.*

*Keep the piece on plane with the down edge parallel to the wall as you ease the piece into position. Check the piece for parallel to the walls before tacking it into place.*

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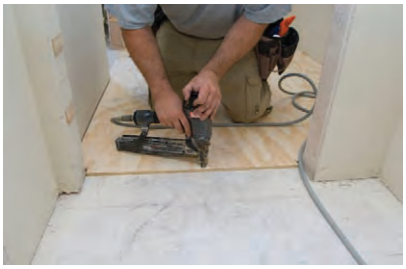
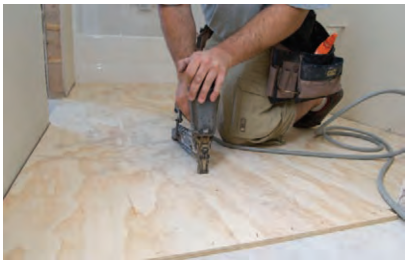
floor breaks, tight seams and thorough fastening will ensure that your underlayment will provide a good platform for your sheet vinyl flooring for years to come. **EHT**

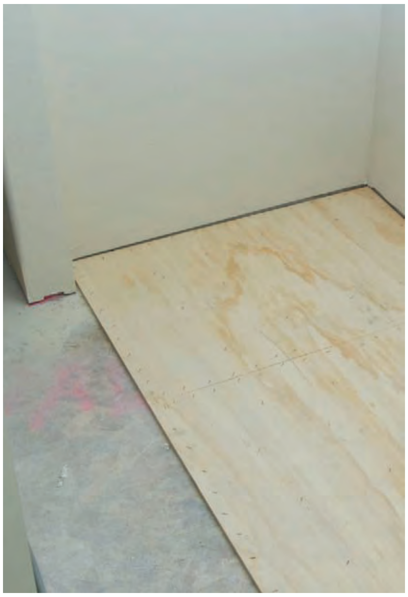
*Bathroom underlayment.*



*Floor breaks at door openings should line up with the center of the door itself.*



*Fastener spacing should be approximately 3 inches on the outside perimeter of each piece.*



*This utility room floor break is well behind where the bifold doors will be, so the flooring cannot be seen when the doors are closed.*

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# KNIFE MAKING 101

**By Monte Burch**

The art and science of making knives is one of man's oldest crafts. Anyone with a few shop tools, the skills to use them, desire and time can create their own knife. Knives can be made from "scratch" using a metal blank for the blade, and wood or other materials can be used for the handle. Knives can also be made from purchased kits. "Made from scratch" knife blades are made by one of two methods: stock removal, or filing and grinding; or forging, also called "bladesmithing." Stock removal is the easiest to do in a hobby shop and can be done with a few hand and power tools. Forging requires much more experience and more tools.

We show making a fixed blade knife with a full-tang handle design. The design as well as step-by-step construction details are from my son, Michael Burch, a full-time, custom knife maker (www.burchtreeblades.com). Although Michael has a full shop with machines built just for knife making, he shows how to use simple hand tools and a few "tricks" to build your own knife. "Knife making can be very dangerous," says Michael. "Always wear full safety goggles, not just glasses, and if power grinding, wear a respirator and hearing protection."

## THE RIGHT MATERIALS

Michael is using a 1-1/2-by-7-1/2-inch piece of 1095 barstock. "Numerous types of steel are available, but 1095 is cheap, easy to work with, and if properly heat-treated it makes a great blade. Purchase hot-rolled or annealed if available as it is easier to work. Do not use soft steel that can be purchased at local big-box stores, as that steel is made for welding."

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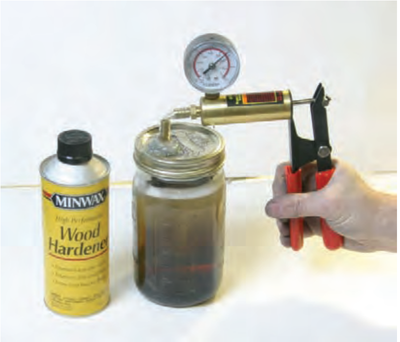
PM EDITOR'S CHOICE AWARDS 08

The knife utilizes crotch walnut wood blanks for the handle. The best woods for knife handles are hardwoods and even better; professionally stabilized wood. The stabilizing process fills the wood pores with a chemical that protects the wood from deterioration. Stabilized wood not only lasts longer, but is easier to grind and finish. Stabilized wood can be purchased from knifemaking suppliers or you can "stabilize" your own wood using Minwax Wood Hardener. Create a stabilizing tool with a mason jar and a brake line bleeder, available at auto-supply stores.

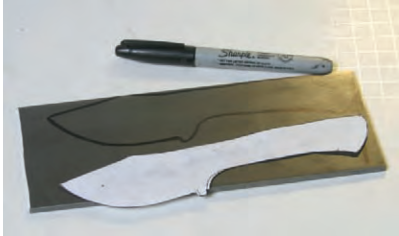
"Install the bleeder through a hole in the jar lid and make an airtight seal," says Michael. "Place the wood in the jar, add the wood hardener and pump the handle until bubbles come out of the wood. This means the wood pores are filling with wood hardener. Do this very slowly and carefully. Do not overdo the vacuum, and always wear safety goggles. Release the vacuum, then remove the blanks, wrap in plastic wrap and allow the wood to dry slowly."

*A knife can be built using only a blade, handle blanks and pins, as well as a few hand tools. Power tools, however, make the chore much easier and quicker.*

The knife shown also utilizes a 3/16-inch stainless steel rod for the pins, and 1/4-inch stainless steel tubing for the thong hole.



*Wood used for handles should be stabilized using Minwax Wood Hardener. A homemade stabilizer can be created from a Mason jar and a brake line bleeder.*



*First step is to create a pattern for the blade. Note that the knife shown has a full tang blade.*

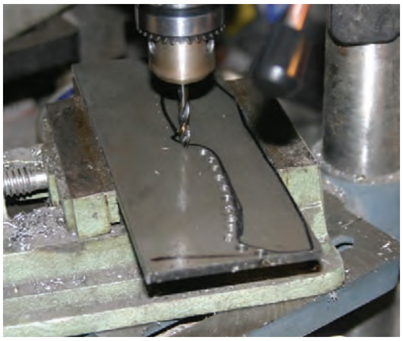
Both are available at full-service hardware stores such as Ace Hardware.

While the wood is curing, Michael starts on the blade blank. "Create a full size paper pattern of the blade and trace it onto the blank using a felt-tip pen. Using a metal punch, create starter dimples for a series of holes around the outside edge of the outline. The dimples should be spaced a little farther apart than the full diameter of the drill bit and half the diameter apart from the outline. Then using a Cobalt drill bit in a drill press, bore the holes. Work slowly, keep the bit lubricated with cutting oil and do not allow the metal to get too hot or you can 'work-harden' the steel. Again, wear safety goggles and make sure the blank is clamped solidly so you don't get 'helicoptering' when the bit catches in the metal. Mark the locations of the pin holes and the thong hole, and bore them as well," says Michael. He uses a chamfer bit to slightly chamfer the holes.

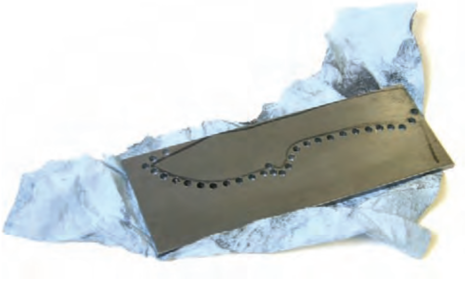
Once all holes have been bored, clamp the blade blank in a solid vise on a sturdy workbench and simply "connect the dots" by cutting between the holes with a good bi-metal hacksaw blade. Naturally, a metal-cutting bandsaw makes this chore quicker and easier.

"Now comes the fun part, shaping the blade," says Michael. The traditional method is filing, but it takes time and effort. Clamp the blade blank in a good solid vise and using a new flat bastard file, file the blank down to the outline. Use a file card to keep the file clean of

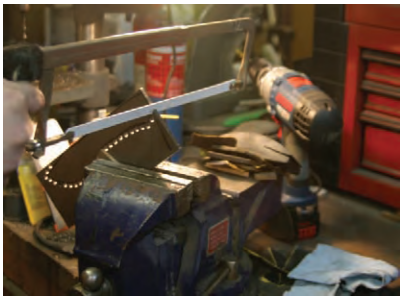
*Use a pin punch to mark locations of successive holes to be drilled around the outline of the blade.*



*With a good cobalt bit in a drill press, drill the holes around the outline of the blade.*



*Shown is the drilled blank, ready to cut free and shape.*



*Use a hacksaw to "connect-the-dots" or cut the metal between the holes.*

metal filings. Always keep the file at 90 degrees to the blank. An upright grinder such as a 1-by-42 grinder will quickly grind the profile down." Put a bucket of water under the grinder to catch the sparks, and wear all safety gear.

Next, find the center of the knife edge. Use a thick Sharpie to mark over the bottom edge of the blank. Place the blank on a smooth, flat surface and use a sharp-pointed drill bit, a little smaller in diameter than the thickness of the steel, to scribe the centerline. Simply roll the bit along the edge, turn the blank over and roll it again, creating two lines down the blade about 1/16-inch wide.

Screw the blade blank down to a solid workbench with the blade protruding over the edge. Use a chainsaw file to create the "plunge" line (where the bevel stops) at the back of the blade. Then use the bastard mill file to

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draw-file the blade to shape, following both the outline of the blade side and the marked centerline on the bottom edge. Again, this takes time and effort, but if the blank is solidly attached, you'll be surprised at how quickly the chore goes. Repeat on the opposite side. Cover the bevel you're creating with a thick Sharpie and file over it to find high and low spots in your blade.

"Now you're ready to fit the handle blanks," says Michael. Lightly sand the blade blank as well as the handles to make sure all are smooth and flat. Place masking tape on the outside face of one handle blank and clamp it to the blade blank. Bore holes through the blade and blank. Remove the blank and mark the inside, then repeat for the opposite handle blank. Mark the outline of the blade blank on the handle blanks and cut them to shape using a bandsaw, leaving the handles slightly oversize.

*Shown is the rough-sawn blank.*

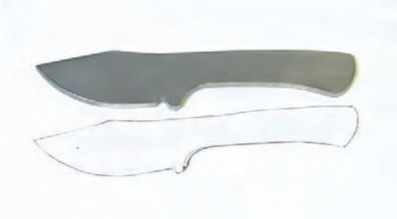
Cut the pins and thong-hole tubing to slightly oversize in length. "Chuck the pins in a portable electric drill and use sandpaper to lightly roughen them and thin them down a bit so they will fit into the holes. They should fit snugly, but not extremely tight into the handle and blade blank holes. If too tight, they can split the handle material," explains Michael. Fit the handle blanks to the blade and tap the pins and tubing in place. Rough-grind the handle and blade blank to shape. Remove the handles, mark the front profile and rough-grind them to shape.

*The old-fashioned way to shape a knife blade is to use a good crosscut bastard mill file to file and draw-file the metal.*

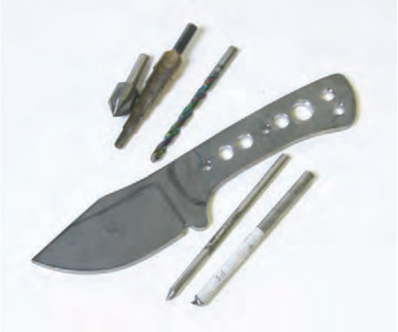
*A variable speed knife/belt grinder makes the chore easier.*

The blade should be heat-treated, and although Michael uses precise specialty equipment to get the most potential out of his blades, he suggested a "primitive heat-treat" that will produce a great knife without the use of a kiln or forge. "You'll need a closable container of peanut oil and a good, hot campfire. A fire of hedge works well because it burns very hot. Let the fire burn down to hot embers and place the blade in the coals using a pair of long metal tongs." The 1095 stock should reach about 1,475-degrees to become "critical," a term used to explain when the steel composition starts shifting to "austenite."

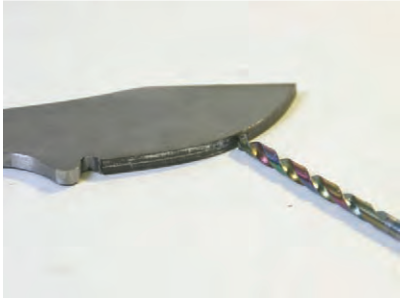
Although not exactly the same temperature; many makers use a magnet to know when the steel starts to austenize. A magnetic "pick-up" tool from an automotive store will work to test the blade. Once the blade becomes non-magnetic, leave it for a few minutes to let it reach true "critical" temperature and then let it cool to black. Do this a few times to help "normalize" the blade. The third time you bring the blade up to temperature, quickly quench the blade in the peanut oil. After it cools; clean the blade and run a file across the edge. The edge should be "glassy," and the file will skate across the edge instead of biting in.



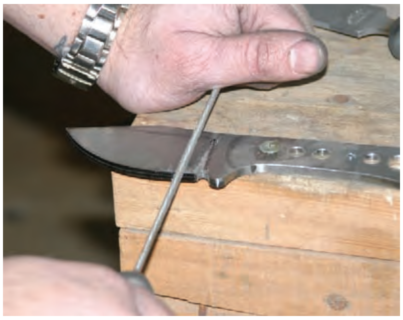
*The rough-shaped blank is ready for drilling.*



*Locate and bore the holes for the handle pins, and a lanyard hole if desired, using a drill press. It's also a good idea to bore additional holes in the handle area to lighten the knife and provide more balance.*



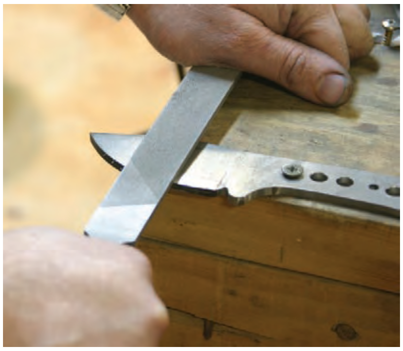
*To locate the center of the knife blade edge, use a fat "Sharpie" to blacken the edge, then scratch or scribe the center line by laying the blank on a smooth flat surface and rolling a drill bit, the same thickness of the blade, along the edge.*



*Now comes the fun part. Use a felt tip pen to create a pattern for the blade shape. Fasten the blank to a sturdy workbench with screws. Then use a chainsaw file to mark the "plunge line" or where the blade edges stop. Do this on both sides of the blade.*

"Now for the tempering," says Michael, "after quenching in the peanut oil, the blade is hard, but extremely brittle. Tempering brings the hardness down and the brittleness out of the steel. Set your kitchen oven to 400 degrees and 'cook' the blade for 2 hours. Wrapping the blade in a couple of layers of aluminum foil will help keep the blade from smelling when being cooked. Let it cool and repeat; your blade is now heat-treated!"

The next step is to finish the blade. "The blade needs to be securely clamped down. Use 3-M Imperial Wet/Dry sandpaper, available in any O'Reilly's or other auto shop." Start with the highest grit possible to get your scratches out—Michael usually starts with 320-grit, but that is after grinding them to a smooth finish. Back the sandpaper with a block of square Micarta or a piece of flattened wood. Use a squirt of Rem-Oil, WD-40 or Windex to lubricate the sandpaper. It helps move the grit out of the way while sanding. Then work up the grits, working them in 45-degree angles to remove the previous grit's scratches. Sand until you get to the desired finish. Michael usually ends with an 800- to 1,000-grit, but a 400-grit finish (called a hand-rubbed finish) still looks great. Clean up



*Using a good bastard mill file, draw-file the blade edge to shape. Use a file card to frequently clean the file.*

*The blade should then be heat-treated. Although professional knife makers use a forge and oven, traditional primitive methods will also work.*

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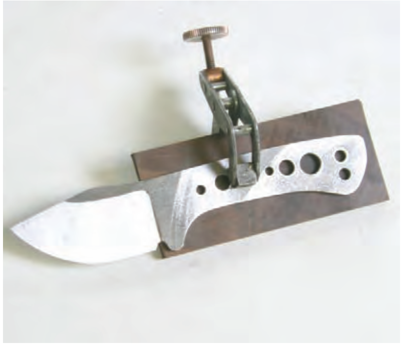
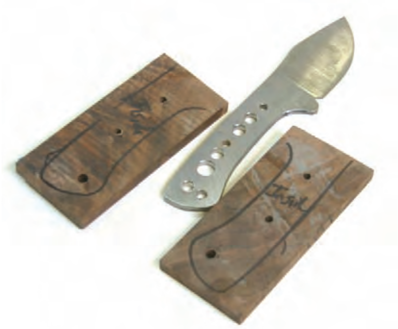
"Clean up the blade with rubbing alcohol to remove any oils and give it a little dunk in Ferric Chloride to 'etch' the blade and bring out the 'hamon.' Vinegar will do the same, but takes a bit longer. Then scrub down with baking soda to neutralize the etchant and run over a few times with the final grit. If you want to 'mark' your blade, a local trophy shop can add your name.

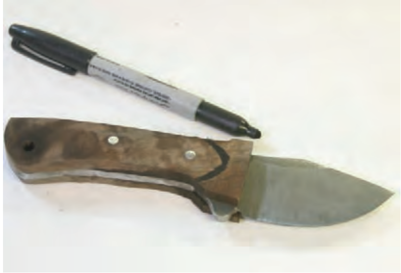
*The blade blank is given a final finish with a belt grinder.*


*Clamp one handle blank to the blade blank and mark the handle outline and location of the pin and thong holes. Repeat for the opposite handle blank.*


*The handle blanks are then ready to be rough sawn to shape on a wood cutting bandsaw or with a saber or coping saw.*

*Lightly sand the pins and thong tube, and chamfer the holes in the blade blank.*

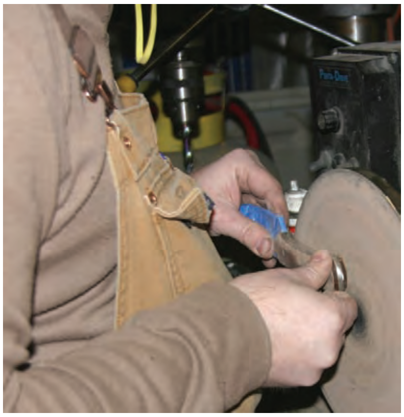
*Tap the pins and thong tube in place to temporarily hold the handles in position.*


*Rough shape the handle using a wood rasp or belt sander, and mark the bolsters, then remove the handles and cut them to outline and shape them.*

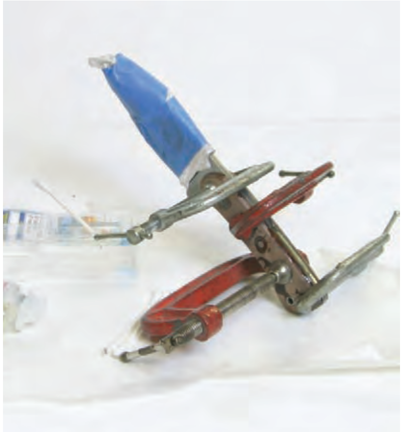
"Now it is time to glue on the handles. Clamp them together to ensure the handle fronts are even on both sides, and finish the fronts to the desired grit." Michael suggests putting a little WD-40 on the blade and wrapping it in a paper towel covered with masking tape to protect the blade while putting on the handles. Lay out wax paper, rubbing alcohol, Q-tips, clamps, and Devcon 2-Ton, 30-minute epoxy. (Five-minute epoxy dries too fast.) Rough-up the tang and handles a bit to give the epoxy more sticking surface. Clean all areas with rubbing alcohol and mix plenty of epoxy. Roll the pins in epoxy and tap them through one handle side, then glue-up the handles and tap the pins all the way through. Clamp to squeeze down the handles, using Q-tips to clean the excess epoxy. Let dry overnight (bring into your house if it's too cold in your shop or garage).

"After everything is dry, grind down the pins," says Michael. "Go slow—you can heat the pins and burn the wood around them very easily." Use a good wood rasp or grinder to shape the handle. A Scotchbrite flap wheel chucked into a drill will help. Finish with sandpaper. Sand until the handles are smooth and scratch-free, then apply Tung or Danish oil.

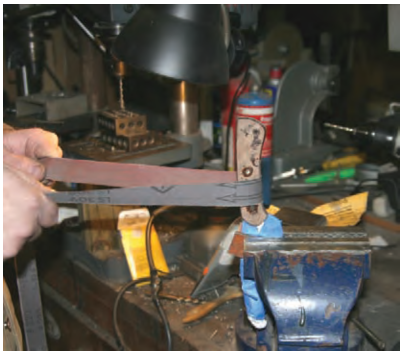
"Obviously; the level of finishing is completely up to you. The process is time-consuming; but the rewards are amazing." **EHT**



*Make sure the handle backs and blade blank are extremely flat and smooth.*

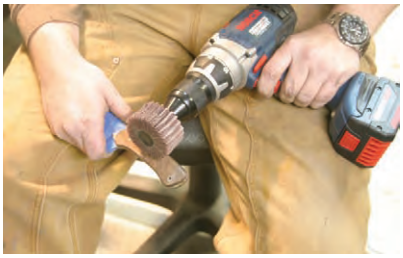


*Use epoxy to glue the handle blanks to the blade blank and tap the pins and thong tube in place. Allow to set overnight.*

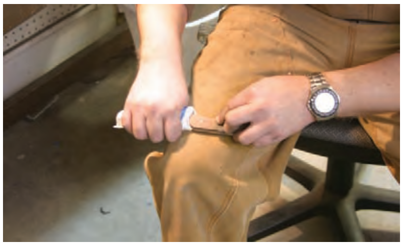


*Continue to shape the handles with wood rasps. With the blade wrapped and taped for protection, use a thin strip of sanding belt to further shape and polish the handle area.*

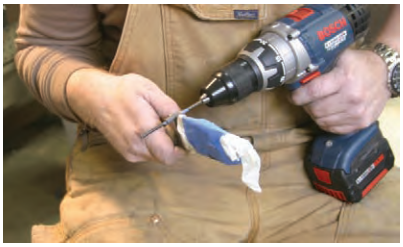
*Again, a belt sander or grinder with progressively finer grits of paper makes this chore easier and quicker.*



*Use a Scotchbrite flap wheel to create a smooth, polished surface.*

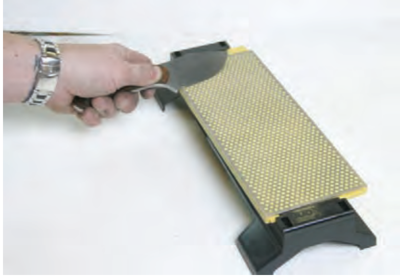


*Smaller pieces of progressively finer sandpaper grits can be used to further smooth the handle.*

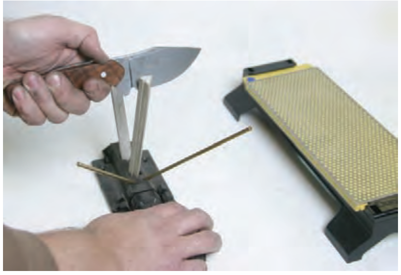


*Tiny pieces of sandpaper, wrapped around a drill rod,help smooth the thong-hole tube.*

*Danish oil is hand rubbed into the handle area.*



*The blade is then sharpened, first using a diamond grit sharpening hone.*



*In the following stage, use a ceramic-stick hone.*

*In addition to the knife detailed here, Michael Burch has created a variety of knives that are popular with collectors. Visit www.burchtreeblades.com.*

# Waterproofing Basement Walls

## Use a masonry waterproofer to conceal stains and prevent water intrusion.

*By installing a gutter and downspouts, water on the outside is diverted away from the basement walls.*

**By Matt Weber**

Nobody likes unsightly stains from mold, mildew or water damage, but that's what occurs in countless basements across the nation. Basements have a tendency to be damp by simple virtue of being the lowest level of the house, often below grade. The basement walls are the barrier between your living space and the gallons and gallons of accumulated water that your home sheds during rainfall.

However, roof runoff is usually not the only contributing factor to the massive amount of water collecting at a home's foundation walls. Basement waterproofing should begin outside your home. Whenever you discover wetness on interior masonry walls, observe what is causing the seepage problem. Check for leaky gutters and downspouts or blocked drainage pipes. Ruts in the landscape or improper grading can also direct water towards your foundation. As the soil around your foundation becomes saturated, hydrostatic pressure forces water through the porous masonry, creating dark stains on the interior surface. For the best waterproofing results, correct all of these exterior problems before applying a masonry waterproofer to the interior block.

For example, the house shown in this article had no gutter along its rear roof line. As a result, during a rainstorm the water was cascading off the roof and pounding a trench along the foundation wall, where it was seeping through the ground and migrating through the cinderblock, as evidenced by stains on the interior. By installing a gutter and a couple of downspouts, the water is channeled away from that troublesome trench and diverted across the yard and away from the house walls. The gutter system will address much of the water intrusion on the outside, and the application of a masonry waterproofer to the interior walls will prevent future stains from occurring. Together, both the exterior and interior approaches will

*Get rid of ugly stains.*

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## PREP THE SURFACE

Applying a masonry waterproofing product is basically a painting project, so begin with prepping the surface of the wall for the best adhesion. Clean the block thoroughly with a wire brush to remove all loose and broken mortar, dirt and dust This particular house had many dirt spots caused by dirt daubers—a type of wasp that builds dirt nests on virtually any flat surface it can grab. Another obstacle to any masonry waterproofer is efflorescence (salt deposits). This white, powdery substance is formed when water-soluble salt compounds in the masonry are drawn to the surface by water seepage. These deposits prevent the waterproofing product from adhering to the surface of the wall. To control this problem, wash with a solution of muriatic acid, according to the manufacturer's directions. Remove old paint by wire-brushing, sandblasting or scraping (beware of lead paint). Most masonry waterproofers are warranted when applied over bare masonry only.

*Scrub away any loose debris and fill cracks and holes with concrete patch.*

As mentioned earlier, the foundation walls of this house also required the removal of mold and mildew stains. Bleach is a well-known killer of mold and bacteria, so I used a solution of bleach and water to scrub away the stains. When all of the mold and other debris is removed, dry the area completely.

Next, use a hammer and cold chisel to chip off any unsightly excess mortar protruding from the joints. If necessary, use a trowel to fill any shallow spots or holes with mortar. Small cracks can be patched with a concrete repair product and troweled smooth.

Also, inspect the floor-to-wall joint for evidence of seepage. When concrete floors cure, they normally shrink and pull away from the wall, creating a gap where water can enter. If this is the case, fill all gaps between the floor and walls with a concrete patching product.

Allow all repairs to dry completely before painting. Then, clear the room of all obstacles and mask off everything you don't want painted. Sheets of cardboard work well to cover the floor during painting. Also, wear clothing that you're willing to sacrifice after painting. The solid material in the waterproofer has a tendency to fly off a paint roller and splatter all over the user.

## APPLYING THE WATERPROOFER

Several manufacturers offer masonry waterproofing products, including Ames, Behr, Quikrete, and UGL. For this project we used UGL's latex-based Drylok product in white. Drylok is also available in gray, beige or blue. The product works by penetrating the tiny pores in the masonry surface and bonds itself to act as an integral barrier to stop water seepage. Ordinary paint only adheres to the surface, and oncoming water pressure can force it off. However, the high solids content in the waterproofer actually plugs those tiny pathways with a heavy coating that can withstand hydrostatic pressure of 10 psi—that's the equivalent to water pressure at a depth of 22 feet (1,440 pounds per square foot). And, hopefully, the walls of your house will never be 22 feet under water.

*Roll on the masonry waterproofer in 3' sections and then back-brush it into the block.*

A thick-bodied product like Drylok fills the porous masonry surface to prevent seepage.

According to the manufacturer's instructions, one should "apply the first coat with a stiff bristle brush working thoroughly into the pores of the masonry surface." I'm sure that works but I was in a hurry.

I opted to roll on the first coat using a roller sleeve with a very thick pile. Roll on the product slowly to minimize splatter. Even when rolling slowly, a roller achieves quicker coverage than brush-applying the entire wall. I worked in 3-foot sections, and then back-brushed the waterproofer with a paint brush to push the product deep into the surface of the block. Proceed in this pattern, rolling then brushing section by section, until you've completed the first coat over all the basement walls.

Bear in mind that masonry waterproofer is a very thick-bodied paint and is not intended to be spread thin like regular wall paint. One gallon will cover 75 to 100 square feet. Plus, two coats are required to ensure adequate waterproofing and to qualify for the Drylok's 10-year product warranty. Allow the first coat to dry completely before rolling on the second and final coat.

## FINISHING UP

Once completely cured, the masonry waterproofer will keep water and mildew at bay, and protect all the items stored in the basement. To minimize dust and any slight amount of moisture at the floor level, we installed a snap-together floor system called Diamondtrax from the Swisstrax company (www.swisstrax.com). We laid a checkerboard pattern with alternating colors of light gray and slate gray. The snap-together floor provides a durable, low-maintenance, slip-resistant floor that provides a softer, more back-friendly walking surface than hard slab concrete. Plus, installation couldn't be simpler. To install the flooring, simply

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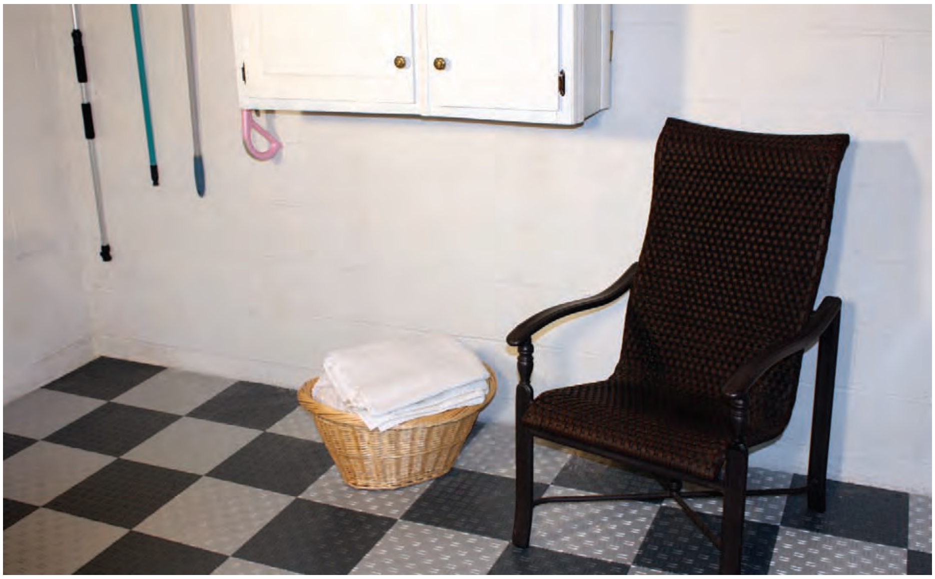
*DL Labs, 2008

place the tiles side by side, interlocking the pegs under one tile with the loops on the edge of the other. We then installed a decorative edging strip where the flooring met the garage door.

In the end, the basement was transformed into a nice, clean area that serves as a laundry room and storage area, including a wall-mounted cabinet and a few storage racks for brooms and mops. It was a marked improvement over the damp, drab concrete cave it used to be. **EHT**



## MASONRY WATERPROOFER RESOURCES

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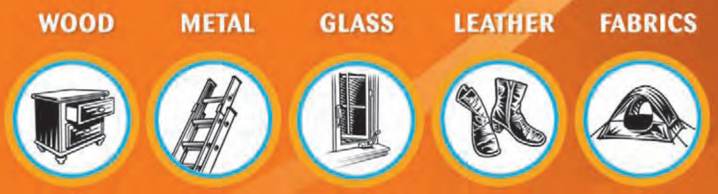

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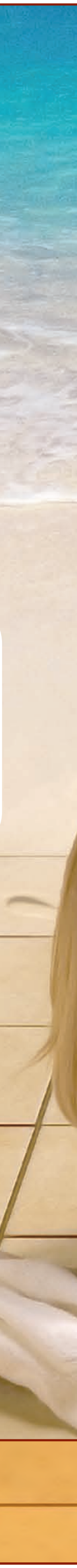

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# Happiness is a Warm Shower

*Exploring advances in water heater technology.*

**By Matt Weber**

Based on a weak economy and escalating energy costs, selecting household appliances such as water heaters can be a balancing act. On one hand, homeowners want comfort and performance, and on the other, they want cost-saving efficiency. A recent survey sponsored by the Propane Education & Research Council reports that almost 60 percent of homeowners say they are likely in the next year or two to invest in new home improvements that would help save energy over time. Among the most revolutionary hot water appliances available are tankless water heaters, which are more energy-efficient than conventional tank heaters since there is no need to maintain heated water. So here's a look at what's new in the world of water heaters and how to take advantage of the new Federal U.S. tax credit.

## TANKLESS HEATERS

Over the past few years, a popular topic among home-improvement enthusiasts is the advent of tankless water heaters manufactured by companies such as Rheem, Takagi, Rinnai, Noritz, Bosch and Stiebel Eltron. Unlike tank-style heaters, tankless gas water heaters are more energy-efficient than conventional because they eliminate the need to continually heat a large supply of water. Also called on-demand water heaters, water enters the gas or electric tankless water heater only when the hot water valve is opened, which then triggers the heating coils or heat exchanger. The amount of energy consumed is proportional to the volume of hot water used. This energy-saving advantage is what makes tankless units today's most popular "green" hot water solution. Furthermore, no matter how many showerheads, and no matter how deep the whirlpool, homeowners will not run out of hot water if using a properly sized tankless water heater.

The compact size of a tankless unit is another benefit. The bulk of the traditional tank-style units comes from the tank itself; so no tank, no bulk. About the size of a medicine cabinet, tankless water heaters can easily be wall-mounted indoors or outdoors, depending on the climate. This affords the ability to place a tankless water heater closer to the point of use, which solves the problem of a long wait for hot water.

Plus, tankless water heaters afford homeowners more control over water temperature. For example, the Tempra tankless electric water heaters from Stiebel Eltron feature the latest advanced microprocessor control that allows the exact water temperature to be set via a dial on the front cover, including a digital display for Fahrenheit or Celsius. With output up to 140 degrees, this new technology ensures the

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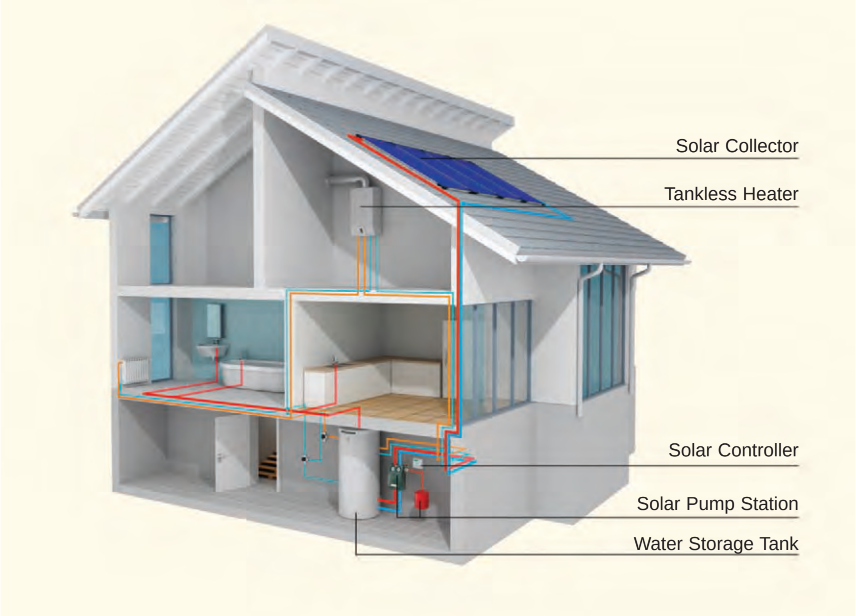


water temperature will not deviate from the set point.

As far as installation, new construction is a breeze with tankless water heaters, and installation costs are comparable to those of a tank-type unit. But replacing a tank water heater in an existing home with an indoor tankless water heater takes a few extra steps, depending on the water heater's location and the piping layout. Because tankless heaters use more powerful burners than their tank-style counterparts, they require larger gas lines. And, indoor tankless water heaters must be vented vertically (through the roof) or horizontally (through the walls). Tankless water heaters have a higher installation cost than tank water heaters, but lower operating costs, less waste and superior hot water delivery. Get a few different quotes for labor, because the installation cost can vary dramatically from contractor to contractor, due in large part to the different approaches they may take when deciding where to locate the heating unit.

*The Tempra Plus tankless water heaters from Stiebel Eltron have a digital display for °F or °C read-out and Advanced Flow Control to automatically adjust flow rate to maintain set point temperature. The Tempra series is also an ideal backup for solar thermal systems. Photos courtesy Stiebel Eltron.*

Tempra Plus
STIEBEL ELTRON
120F

## TANK TECHNOLOGY

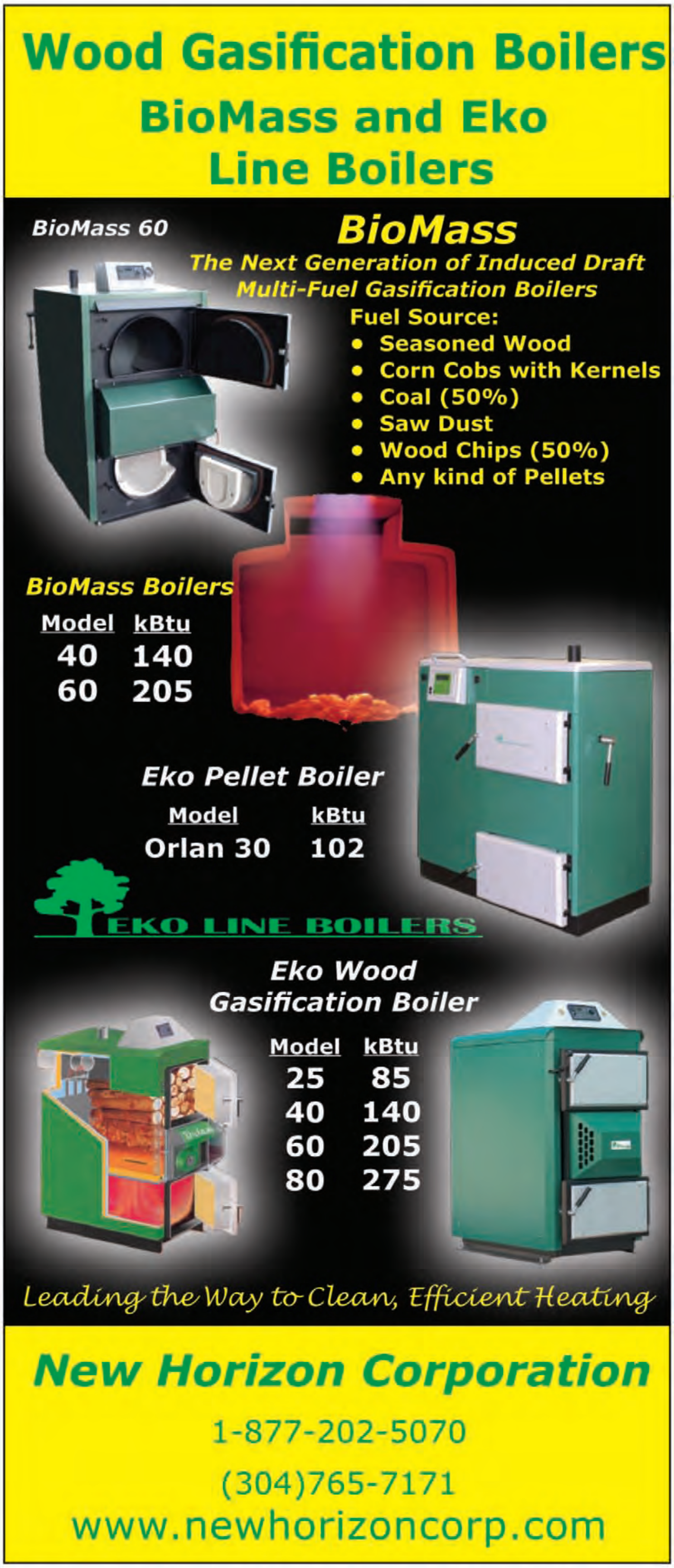
A household standard for many years, tank-style water heaters provide a large volume of dependable hot water. Fuel sources include propane, natural gas or electricity, and these units are the most common way to heat water in the United States. A typical residential tank water heater stores between 20 and 80 gallons, heating the water 24/7, usually at the factory setting of 120 degrees F. However, there is only so much room in the water tank, so if demand is high or the unit isn't sized correctly, the hot water can run out. The large size of a tank unit is another aspect to consider. Because of their bulk, tank water heaters are typically located in the garage or basement, but this can put the hot water source far from the point of use. When homeowners complain that it takes too long for the hot water to reach the bathroom, this is usually the reason.

Like any major appliance, the tank heaters should be carefully matched to the demands of the house. According to industry experts, upgrading a standard 5-by-9-foot bathroom to a master suite or an in-home spa may require upgrading to a larger unit, especially if the new bathroom will include high-capacity furnishings like a deep soaking tub with a multi-head shower system. However, if this is the case, replacing a tank water heater with another tank water heater is fast and keeps labor costs to a minimum. If a remodeling budget is tight, tank water heaters are the most affordable choice, because of the minimal labor required. The cost of professional installation is typically between $500 and $1,000.

*Rheem has introduced the first fully integrated Heat Pump Water Heater. With an Energy Factor (EF) of only 2.0, the new air-source heat pump water heater offers more than twice the energy efficiency of a standard electric storage water heater. Photo courtesy Rheem.*

It should be reiterated that traditional tank units heat water even when it's not in use. Insulation between the storage tank and the outer jacket reduces the heat loss, but cannot entirely eliminate it. To maintain a preset water temperature, the water heater must use energy to cycle on periodically, even when there is no demand for hot water.

However, Rheem has recently introduced a groundbreaking advancement in tank heater technology—a fully integrated Heat Pump Water Heater. With an Energy Factor (EF) of only 2.0, the new air-source heat pump water heater offers more than twice the energy efficiency of a standard electric storage water heater. Instead of heating stored water directly with a conventional electric element—or with a burner, as in the case of a gas unit—a heat pump water heater transfers available heat from the ambient air, intensifies the heat and transfers the heat into the water, which is a far more cost- and energy-efficient process. Intended for residential applications, both new construction and drop-in replacement of existing water heaters, the unit has a storage capacity of 50 gallons and qualifies for an Energy Star listing and the federal tax credit. Plus, by measuring only 21 inches in diameter



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and 75-1/2 inches tall, the new unit offers a slimmer, more portable profile that makes it easy to install in spaces with restricted access.

The concept is already catching on as Stiebel Eltron has just released its own heat pump water heater, the Accelera 300.

## SOLAR HEATED WATER

Solar water heaters use a dark-color solar collector to capture free energy from the sun, making it the most environmentally friendly home water heating option available. These solar systems can be "passive," meaning the water flows between the collection area to the storage tank via gravity or some other non-mechanical means; or "active," which uses a pump to circulate water through the system. The passive systems have both the tank and collector located on the roof, taking full advantage of the direct sunlight. However, some roofs aren't designed to support the weight of the water tank (and some homeowner associations may frown on a roof-mounted tank), so an active system is the alternative. The active systems have the tank and pump located in the house or garage, although

*Solar collectors can heat water in the household and provide additional support for the central heating system. Photo courtesy Bosch Gmbh.*

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the pump that forces circulation does require more energy than passive systems.

Even the most efficient solar water heaters usually require some auxiliary heating to boost the performance. This may be because of a high water demand in the evening or after a long period of cloud cover. An electric, gas or other fuel-type booster can be quite effective in enabling a solar water heater to provide a year-round supply of steaming hot water, but of course that also boosts energy demands.

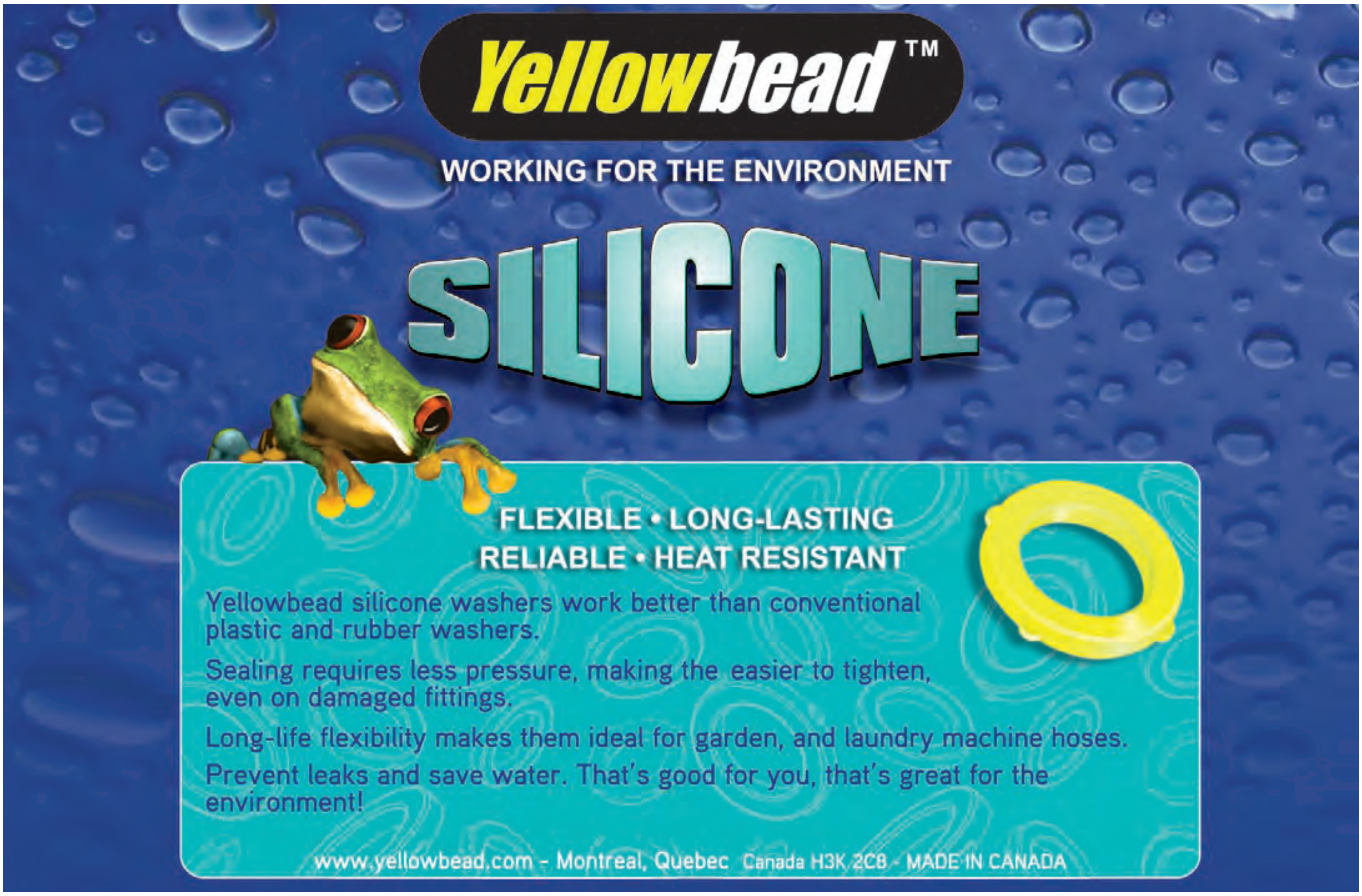
## TAX CREDIT FOR ENERGY-EFFICIENT UPGRADES

In February of 2009, President Obama made significant changes to the homeowner tax credits for specified energy-efficient home improvements. These improvements include qualified heating and cooling products, such as tankless and solar water heaters. These revisions include an extension of the tax credit through 2010. Homeowners who purchase a qualified heating and cooling product before December 31, 2010 are now eligible for a tax credit equal to 30 percent of the full purchase and installation price. There is a $1,500 cap on the credit per home. (Some improvements, such as solar water heaters, may not be subject to the $1,500 maximum.)

For more information on how to take advantage of the tax credit, visit the IRS website at www.irs.gov.

## BOILING IT DOWN

As you can see, there are pros and cons to each type of water-heating system. The more efficient tankless systems have a greater upfront cost, but can pay off in energy savings and performance down the line. A replacement tank heater is less costly to install but requires more energy usage. And even the greenest of options—solar heating— requires some cooperation from Mother Nature to wring the most energy efficiency and performance from the system. So the next time you're selecting a system, carefully weigh your initial installation budget against your long-term utility costs. And always keep up on the latest technology, because water heating is an ever-evolving industry. **EHT**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## WORK SHARP KNIFE & TOOL SHARPENER

Professional Tool Manufacturing enhances the capability of the Work Sharp 2000 tool sharpener/precision grinder with the new Knife Sharpening System. Work Sharp brings used and damaged shop tools such as chisels, screwdrivers, pruning shears, axes, lawnmower blades, putty knives and pry bars back into service. Work Sharp can also be used as a precision grinder for surface preparation tasks. The new Knife Sharpening System uses conforming belts of various grits and a magnetic sharpening guide to precisely sharpen knives to razor sharp results. With the knife sharpening guide removed, it provides a detail belt grinding solution for a wide range of grinding and polishing tasks. The Work Sharp system reduces sharpening time dramatically, increases sharpening and grinding precision, and lets you grind and sharpen with a single simple machine. Visit www.worksharptools.com.

## FLEXIBLE, COLLAPSIBLE DRAIN PIPE

Flex-Drain is a flexible, collapsible 4-inch drain pipe that bends, expands and contracts to fit any need. It comes in a convenient package about the size of a tool box, and easily expands into 12- and 25-foot lengths (solid and perforated), plus a 25-foot perforated with sock. It is also available in a 50-foot contractor pack in both solid and perforated. Compatible with traditional 4-inch corrugated drain pipe, Flex-Drain offers integrated "soil tight" fittings molded into the product for easy connections. The pipe is flexible and, once bent, will hold its shape, reducing the need for additional fittings and cutting. Also available is a full line of fittings that work universally with most 4-inch pipe products, including couplers, flexible downspout adapters and more. Visit www.flex-drain.com.

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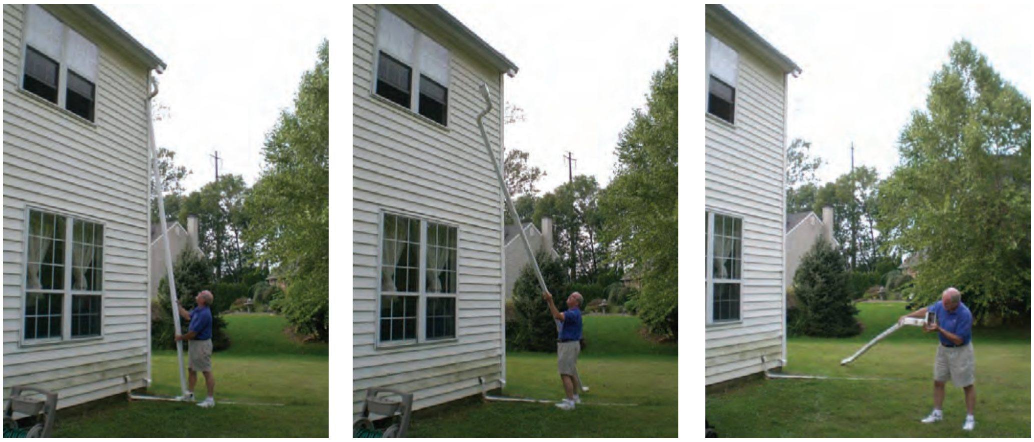

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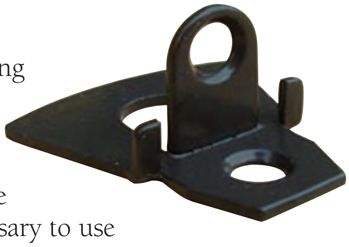
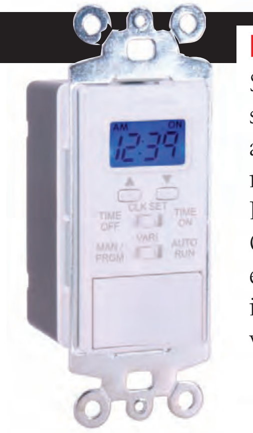


The Hidden Link hidden deck fasteners, recently endorsed by the Trex decking company, eliminate visible fasteners on the decking surface, because the fasteners are attached to the joists and hidden by the subsequent deck board. The Hidden Link system also allows air to flow between the deck boards and the joist, enabling the joists to continually dry out (preventing the acceleration of rot). No hammering is required for installation, nor is it necessary to use an expensive biscuit cutter. The Hidden Link fastener works well with exotic hardwoods and composite decking. Visit www.shadoetrack.com.



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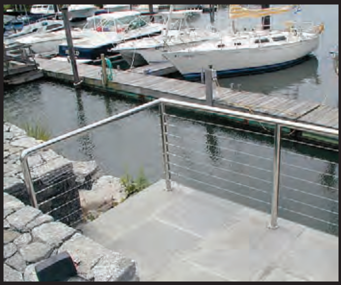

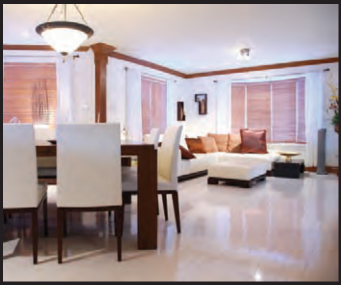

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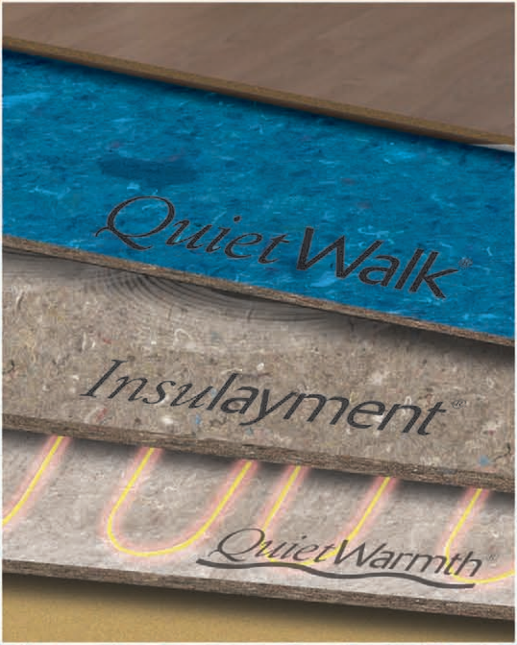

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